Railway Engineering Maintenance

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SINCE January 1935, approximately 750 miles of U·S·S Steel Bearing Piles have been driven to ensure lasting safety and economy on 384 projects. Large jobs and small jobs. Fresh water and salt water. Under buildings, bridges, viaducts, dams, piers and docks. The longest single length pile ever driven—128′6″—is a U·S·S Bearing Pile in the foundation of Boston's Commonwealth Pier (Fig. 3). U·S·S Steel Bearing Piles set a world's record as the largest lineal footage, 929,245 lin. ft., ever driven on a single undertaking (Fig. 5).

Whether conditions are usual or out-of-the-ordinary, these easily driven U·S·S Steel Bearing Piles are money-savers. Their capacity for high unit loads, both vertical and horizontal, permits fewer piles and driving operations for a given load. Contractors tell us that they are easily handled in the field by ordinary equipment—are easy to splice, withstand rough handling, eliminate jetting, require less shipping and storage space.

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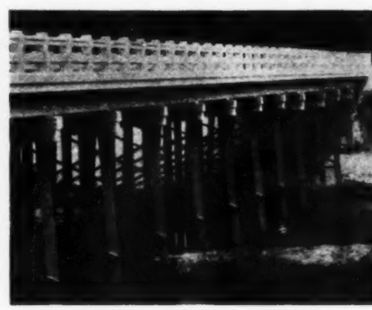
HORIZONTAL LOAD RESISTANCE. In addition to heavy vertical loading, 6 tons of lateral loading per pile must be safely carried by the foundations for Emsworth Dam on the Ohio River. Engineers chose U·S·S CBP Steel Bearing Piles because of their high resistance to combined stresses. They proved practical and easy to drive.

BIG TONNAGE—"ON-TIME" DELIVERIES. 8,121 U·S·S Steel Bearing Piles support the foundation of the Ford Motor Company's new press plant at River Rouge. Approximately 1600 tons of these sections, in single lengths up to 105 ft., were shipped weekly to ensure rapid progress and on-time completion of this important foundation job.



DOUBLE PURPOSE. Note the perfect alignment and simplicity of this trestle in Clay County, Florida. Here is an effective double-purpose design. U·S·S Steel Bearing Piles act both as bearing piles and trestle bent columns. To withstand flood-borne loads and impacts and lateral shocks, experience dictates the choice of U·S·S Steel Bearing Piles.

USS

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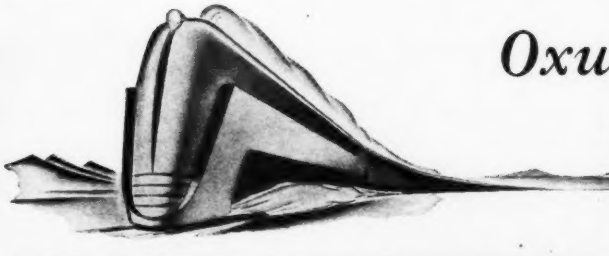

Oxweld Railroad Service TOPICS

1912 — OVER A QUARTER CENTURY OF SERVICE TO AMERICAN RAILROADS — 1939

REPAIR FROGS AND SWITCH POINTS *at a fraction of replacement cost*

Rebuilding worn switch points and the points and wing rails of frogs restores these parts to serviceable condition for as little as one-tenth of the cost of new units. These repair operations should be done in track if traffic is not too heavy. Otherwise, the switch points and frogs can be removed and reconditioned on the right of way or at the reclamation shop. Oxweld has developed a special welding rod for this work which provides a wearing surface that resists the impact and abrasion of heavy traffic and increases the service life of frogs and switch points.

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Maintenance-of-way departments of some railroads have been fabricating frogs and crossings from short rails and steel plate. Substantial savings can be effected in the fabrication of non-stock units with this new Oxweld development. Oxweld representatives will assist customer railroads in preliminary planning of the work and completion of the fabrication. In addition to the usual cutting and welding applications, the oxy-acetylene blowpipe is used for localized heating in the bending operations required in this work. A future advertisement will give more detailed information on fabricated special trackwork.

• • •

SURFACING SWITCH SLIDE PLATES

A repair operation which can be economically performed at the same time as the rebuilding of switch points is the surfacing of switch slide plates. Oxweld supplies a specially-developed, wear-resistant welding rod which is well-suited for the resurfacing work.

• BRIEFS •

Butt-Welded Rail — Maintenance of joints and signal bonds is eliminated and smooth-riding track is obtained when rail is butt-welded with the Oxweld Automatic Pressure-Type Rail Welding Process.

• • •

Hard-Facing — Haynes Stellite hard-facing rod is being increasingly adopted for protecting the wearing parts of equipment used in railroad yards. Recent applications include numerous car-retarder parts, tamper bars, shovel edges, and the wearing surfaces of other maintenance-of-way equipment.

• • •

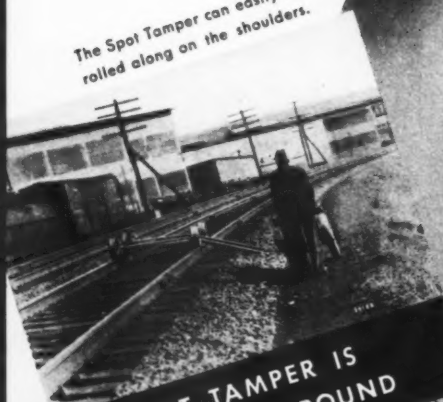
Switch Point Protectors — To prevent damage to new or rebuilt switch points by wheels of cars and locomotives, switch point protectors may be provided by building a boss on the gauge side of

the rail a short distance in front of the switch point. A completed protector made in this manner is shown in the illustration.

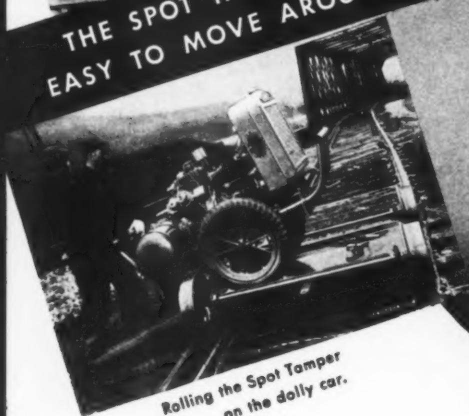
• • •

In addition to bringing oxy-acetylene welding and cutting to railroads, Oxweld Railroad Service provides heat-treating of rail ends, hard-facing of wearing parts, pressure welding of rail, and "Unionmelt" welding. If there is a place for any of these processes in your operations, consult The Oxweld Railroad Service Company, Unit of Union Carbide and Carbon Corporation, Carbide and Carbon Building, Chicago and New York.

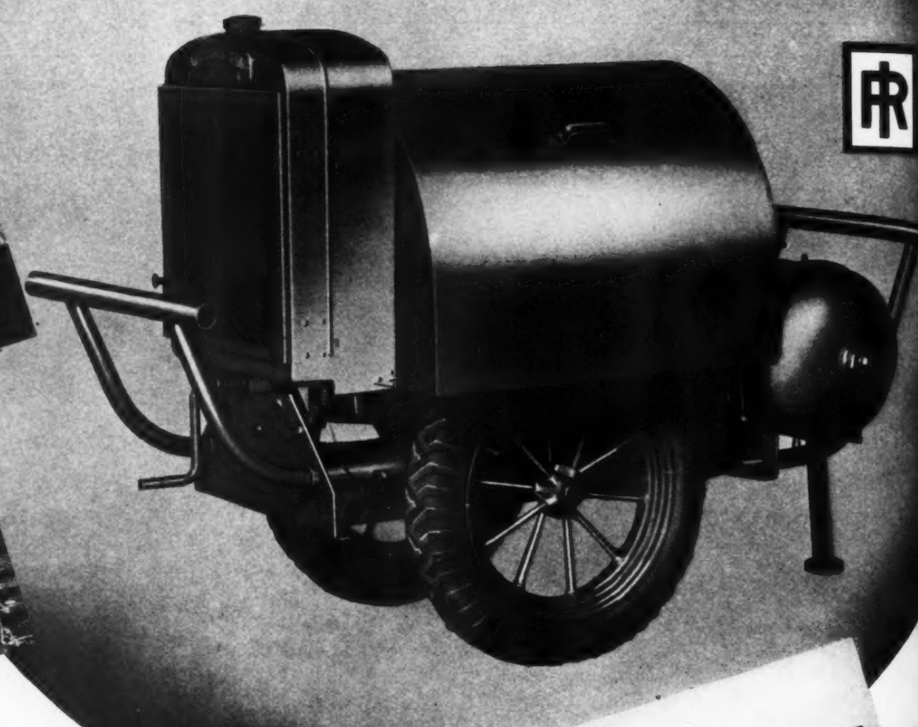
OXWELD RAILROAD SERVICE

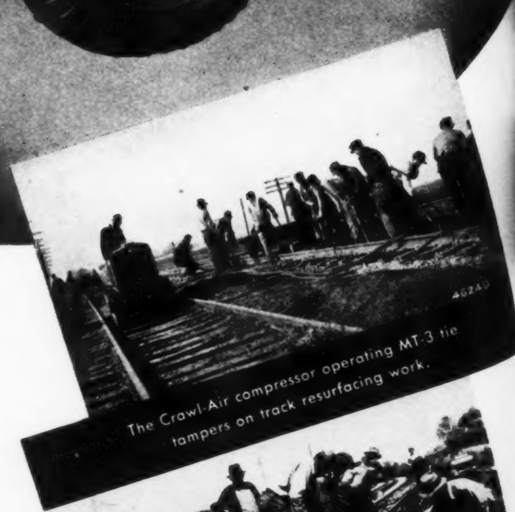


The Spot Tamper can easily be rolled along on the shoulders.



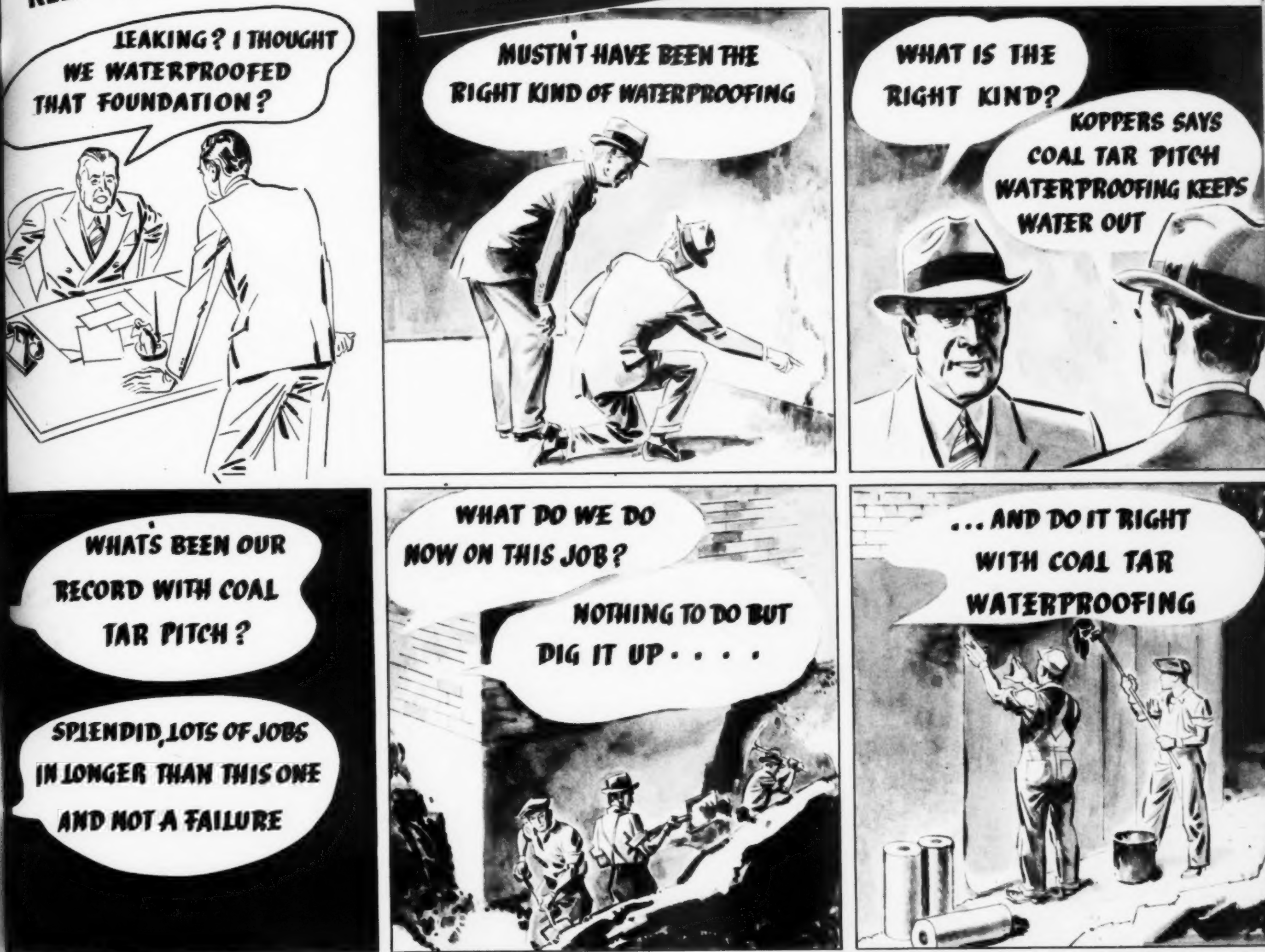
Rolling the Spot Tamper on the dolly car.

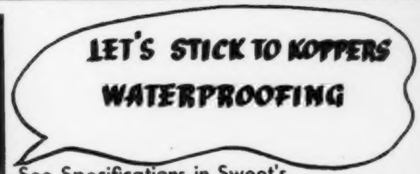




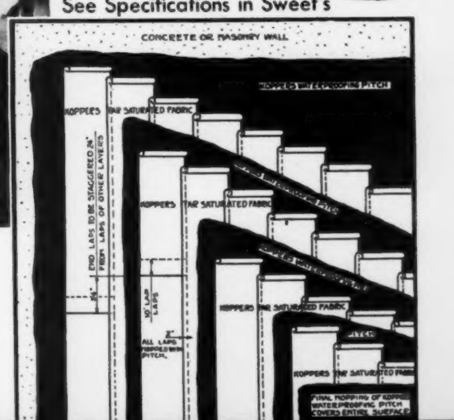
The Crawl-Air compressor operating MT-3 tie tampers on track resurfacing work.

KEEP OUT WATER WITH KOPPERS COAL TAR WATERPROOFING ★





See Specifications in Sweet's



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K O P P E R S

Most progressive roads have outlawed hand adzing of ties as an obsolete method employed when laying rail. A statement recently made by a prominent maintenance official best proves this claim:

> "None of us would like to go back to hand adzing, not only because of the increased force required but rather on account of the less accurate and exact work possible with hand adzing as compared with machines. The cost of rail and fastenings, and the strain and load to which they are subjected under modern traffic and speed, demand the greatest care and accuracy of work connected with the handling and laying of rail."

The Nordberg Adzing Machine provides both essentials of rail laying; doing the job economically and a quality of work which far surpasses that of hand methods.

Here three men are doing the work of thirty. As the Adzing Machines pass over the ties, they leave every tie seat level and in the same plane.

Power Tools for Your Maintenance Jobs

Adzing Machine	Rail Grinder
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Track Shifter

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No. 125 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: A Measure of Value

May 1, 1939

Dear Reader:

"To an advertiser, the most important thing to know is that there is a reader who is in the business to which the magazine is addressed. After many years, the only thing I have tagged, and the only thing I am convinced that I can tag is the reader audience of a publication.

"Who's your editor, I ask. What is his experience in the field? What does he know about his industry? Do the readers respect his judgment? Does he give them material written by those who know what they are talking about and whose names are known to the industry? In other words, what's inside your magazine to attract and hold your reader?"

This, in brief, is the evaluation placed on you, our readers, by Mabel Potter Hanford, America's largest individual buyer of space in business magazines, whose purchases exceed a million dollars annually in her capacity as business paper space buyer for Batten, Barton, Durstine and Osborn, Inc., advertising agency. It constitutes a measure of the value of a magazine as a medium for advertising by which we are glad to be judged.

The Audit Bureau of Circulations confirms our analysis, for illustration, that 91 per cent of you are employed directly in supervisory capacities in the maintenance of the railways; and that 6 per cent more of you are engaged, as representatives of railway supply companies, in the production and sale of the materials and equipment employed in maintenance; while only 3 per cent of our circulation goes beyond the immediate limits of maintenance activities.

As regards our editors, every one whose name appears on our masthead came to us direct from railway service after working several years in direct contact with maintenance operations. Their experience in maintenance activities averages more than 21 years per editor; they travel collectively more than five times around the globe each year, gathering the information that is presented to you from month to month.

That you find this information helpful to you in your daily work is indicated by the fact that, despite the most acute depression in history when maintenance forces have been reduced severely, your percentage of renewals averages more than 73, a figure considerably above the average for magazines as a whole, even in more normal times.

Yes, we are proud to be measured by the standard set up by America's largest buyer of advertising space in business magazines. And we are happy that she has selected our magazine from time to time as a medium for the presentation to you of the products of clients of hers.

Yours sincerely,

Elmer T. Howson

Editor

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MAY, 1939

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Taxes

What They Mean to Railway Employees

ARE railway employees aware of and concerned with the increasing demands of the tax gatherer? In general, they are rapidly becoming tax conscious, so far as their own individual affairs are concerned. They are confronted, in most states, with the necessity for paying sales taxes on the food and clothing and other necessities that they purchase; they are taxed for admission to their favorite "movie"; if they own an automobile, they are taxed for the privilege of ownership, and again for the privilege of operating it; they are taxed on the money they earn and if they are provident enough to own a home, they are penalized for their thrift at a rapidly ascending rate. And governmental officers are zealously searching for still more means of extracting greater amounts of money from the individual.

Taxes Reduce Employment

But these individual taxes, numerous and burdensome as they are, are not the sole concern of the railway employee. In these days when he has seen his associates deprived of work by the thousands and hundreds of thousands, and has encountered three-day weeks and other forms of shortened working periods himself, he has been brought face to face with the stern realization of the fact that his own livelihood and prosperity are bound inseparately with the prosperity of his industry—the railways, and that any condition or trend that affects his industry adversely, cannot but also affect his own interests likewise. It is in this light that he acquires a very definite interest in the trend of railway taxes, which is very comparable with his own.

In the accompanying table are figures showing the amount of taxes paid by the railways for specific years, the number of railway employees and their average compensation in those years, and the average tax payments per employee. There also appear the total dividend payments made to the owners of the railways.

These figures are very illuminating. They show, for illustration, that the total tax payments made by the railways *increased* 117 per cent in 1938, as compared with 1916, while the total operating revenues of the roads were actually $32,000,000, or 1 per cent, *less*. More specifically, they show that the taxes paid *per employee increased* 282 per cent in these 22 years, or from $95 in 1916 to $363 in 1938—and that in this same period the average compensation per employee *increased* only 108 per cent. And the income received by the owners of the railways in the form of dividends *declined* 73 per cent.

Effect on Employees

If the taxes paid by the railroads per employee had increased only in the same ratio as the compensation of employees, the railways would have had $155,000,000 more in 1938 to distribute among their employees or stockholders or to devote to much needed improvement of their properties than was actually available. Expressed in terms of employees, it would have provided the means for paying 83,000 more furloughed employees throughout the year. And the challenging observation about these figures is that, measured in terms of tax payments per employee, they are still rising, having increased 20 per cent in the last two years and 50 per cent in the last 7 years to a new high record in 1938.

Year	Taxes	No. of Employees	Taxes per Employee	Average Compensation per Employee	Dividend Payments
1916	$157,113,372	1,647,097	$ 95	$ 892	$306,176,937
1921	275,875,990	1,659,513	166	1,666	298,511,328
1926	388,922,856	1,779,275	218	1,656	399,243,963
1931	303,528,099	1,258,719	241	1,664	330,150,873
1936	319,752,721	1,065,624	300	1,735	169,829,290
1938	340,780,000	939,505	363	1,859	82,732,571

Developing these comparisons still further, the tax collector received 10.6 per cent as much as the employees in 1916; he received 19.5 per cent as much in 1938. At this rate, the time is not far distant when he will share equally with the employees in the division of that portion of railway income available for taxes and payrolls.

A further observation for the consideration especially of those who are openly advocating or through subversive measures are endeavoring to bring about government ownership of the railways is the direct and immediate loss in tax income that would result from such a development, a burden that of necessity would be transferred to other industries and property owners. This loss of tax income from the railways, if it should occur, greatly exceeds the income derived from the various forms of corporate and "nuisance" taxes that are the cause of such widespread debate and criticism today.

This trend of rising railway taxes shows the very direct interest that every railway employee has in the mounting taxrolls, over and above his own direct contributions thereto. Such a trend constitutes a menace to his own future security. As such, it challenges his best thought and effort to aid in bringing about a control over public expenditures that will effect a reduction in railway as well as in individual taxation.

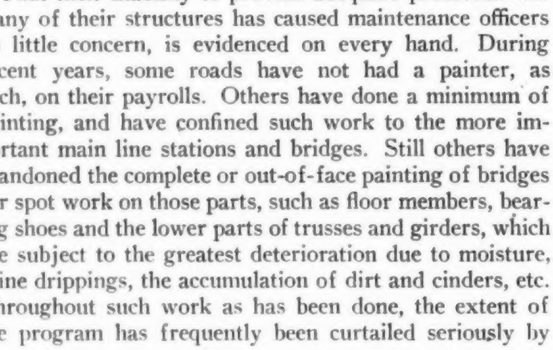
Painting—

Better Chance to Get Some Authorized

FROM the standpoint of appearance, if not from that of actually protecting many units of railway property from further deterioration, bridge and building painting is due for increased attention. Everyone recognizes that safety of operation must be given primary consideration in the allocation of funds for maintenance work, but there are many maintenance men, who, knowing of the deterioration that is now taking place in their fixed structures as the result of long-deferred painting, are determined to give this work "right-of-way" over other work this year, just as soon as the demands of safety have been satisfied.

In the eyes of many maintenance officers, appearance, of necessity, is assuming less importance, for while they fully recognize that they have a responsibility for the looks of the structures under their direction, they also realize that they have a greater responsibility for protecting the service life and safety of these structures. Furthermore, they recognize that their managments will quickly authorize painting to effect improved appearance when funds become available, but that, in the meantime, they are likely to overlook the fundamental purpose of painting (protection) unless this is brought to their attention repeatedly.

That their inability to provide adequate protection for many of their structures has caused maintenance officers no little concern, is evidenced on every hand. During recent years, some roads have not had a painter, as such, on their payrolls. Others have done a minimum of painting, and have confined such work to the more important main line stations and bridges. Still others have abandoned the complete or out-of-face painting of bridges for spot work on those parts, such as floor members, bearing shoes and the lower parts of trusses and girders, which are subject to the greatest deterioration due to moisture, brine drippings, the accumulation of dirt and cinders, etc. Throughout such work as has been done, the extent of the program has frequently been curtailed seriously by the extent of the cleaning work required as the result of long neglect. In many cases the cost of this essential preliminary work has exceeded the actual cost of painting.



With increased traffic and earnings in prospect for the present year, and with the enlarged funds which will be available for the maintenance of way department if these increases materialize, it would seem desirable for bridge and building officers to re-check their requirements for painting work and to let the facts be known in no indefinite terms. With so many classes of work demanding consideration from the funds that will be available, those which are pushed to the forefront are more likely to receive preferred attention, to the neglect of equally, or more important, work, which has no sponsor. With so much painting required to prevent the serious deterioration of essential, costly structures, it would appear a propitious time for those responsible for their maintenance to urge their requirements again.

Gaging

Should the Ballast Gang Regage New Rail?

ONE of the controversial subjects in track maintenance is whether the track should be regaged by the ballast gang that is surfacing newly laid rail. On one side it is held that the rail gang should be required to gage accurately and that if this is done it will be a waste of time for the ballast gang to repeat the work of the rail gang. This group also contends that, since the pulling and redriving of the spikes tends to reduce the life of the ties, the full responsibility for gaging should fall on the rail gang. The opponents claim that while a high quality of work should be demanded of the rail gang, one should not insist on too much refinement as this will reduce production and raise the cost of laying the rail disproportionately when compared with the cost of regaging by the ballast gang.

Obviously, the matter goes deeper than these arguments would indicate. In the first place, no laxity in the gaging of the new rail should be permitted, whether the track is to be ballasted at once or after a considerable interval. In general, tie renewals are heavy where new rail is laid, for this work is generally deferred for a year or two prior to the renewal of the rail, and considerable spacing and straightening of the ties will be required in connection with the renewal of the ballast. Even where double-shoulder tie plates are in service, this cannot be avoided entirely, and where ties are shifted, and especially where they are straightened, irregularities in gage develop, regardless of the care with which it has been maintained previously. Again, even where the track is not disturbed, irregularities in gage develop after the new rail has been in service for a time and these irregularities are often of sufficient magnitude to make regaging necessary or desirable.

A foreman of long experience in laying rail on a road that always surfaced its new rail as quickly as possible after it was laid, was once detailed to ballast about 20 miles of rail that he had just laid. He was astonished at the omission of refinements that he found in his own work, including the amount of gaging he found neces-

sary, for he had always regarded his work in this respect as being done to the highest standard of excellence. He resolved that in the future he would correct all of these errors of omission, and did so, although his labor cost was increased appreciably. Again he was assigned to ballast some of the rail he had laid, and again he was astonished, for his labor cost for ballasting was also increased appreciably and he found that he had to undo much of the work he had been at so much effort to do to the higher standard, one of the important items being that of gaging.

It is axiomatic that rail should be gaged accurately when it is laid. Yet the experience of this rail-gang foreman is not unique, but can be repeated on any road or by any similar gang. It should be recognized that when the track is disturbed, as it must be of necessity, in ballasting and the incidental requirements of renewing, respacing and straightening ties, irregularities in gage cannot be avoided. For this reason, it should be a rigid requirement that the regaging work after the rail relay should be a part of the work of the ballasting gang, whether it is surfacing old or new rail.

Ties

Is the Hewed or the Sawed Tie Superior?

MOST of the older trackmen, drawing on their early experience before the preservative treatment of ties became common, are firmly convinced that the hewed tie is superior to the sawed tie. The younger men, whose major experience has been with treated ties, are not so sure, yet many of them also prefer the hewed tie. This raises the question whether the hewed tie possesses inherent superiority over the sawed tie, provided both have been given preservative treatment.

In general, the hewed tie is cut from trees of smaller diameter so that the pith is more likely to be centered in the tie, while the heart is surrounded by sapwood which is easily penetrated by the preservative, thus insuring a zone of well impregnated wood around the heartwood. In contrast, the sawed tie is usually cut from larger logs so that most of its exposed surface is heartwood. Again, the sawing is rarely parallel to the axis of the tree so that the grain is not always parallel with the sides of the finished tie, while the pith may be exposed along one edge or face. For this reason sawed ties are more susceptible to splitting and checking after they are in the track. Since the heartwood is more resistant to the penetration of the preservative, the preservative protection is not always so dependable.

Furthermore, owing to the manner in which hewed ties are made, the surface is parallel with the grain and is smooth, so that during the seasoning period it sheds water better than the sawed tie, the surface of which is roughened by the saw teeth, this being a distinct advantage during long periods of wet weather. On the other hand, sawed ties are more uniform in size and nearer the specified dimensions, hence they can be stacked to provide better circulation of air while seasoning, they are more easily handled and inserted in the track, and provide a more uniform bearing on the ballast.

Thus, while hewed and sawed ties each possess certain advantages, experience has shown that neither is inherently superior, provided both have been manufactured properly and conform to the requirements of the A.R.E.A. specifications, assuming of course that the timber in each is of the same kind and quality and that both have been properly treated with the same preservative. Records of service do not disclose a longer life for one than for the other, or that either is more resistant to decay or the forces that produce ultimate failure.

Winter Equipment—

Should Be Put Away in Good Condition

WINTER has now gone, but there is still one task in connection with it which remains to be completed on many roads, and that is to see that the special equipment and tools which have been held in readiness or used during the winter for coping with snowstorms and winter conditions generally, are carefully put away for another year. With spring work programs well under way, the storing of winter equipment may be looked upon as a nuisance, with none of the incentive involved in getting the equipment ready for service, but it is one of those tasks that should be done and done well, to maintain the equipment in the best of condition and to simplify the work of rounding it up and distributing it over the line at the approach of another winter.

This is not the simple job that it was on many roads a few years ago, when brooms and shovels constituted the larger part of the snow-fighting equipment and could be readily shipped to the storehouse for safekeeping. Today, many roads have large investments in mechanical snow-melting and snow-handling equipment, and these investments must be protected by so storing this equipment that it will not deteriorate, become lost or be stolen during the summer.

Most roads have well-defined plans for repairing and storing their heavier units of snow-fighting equipment, such as plows and flangers, so that this equipment moves into the mechanical department shops for attention. This overhauling should not be overlooked under the pressure of other duties which may arise during the summer. This is a particularly important consideration at this time because late fall work is itself becoming a problem on many roads, with the reduced forces which prevail, and may prevent giving the equipment proper attention at that season, with the uncertainty which this would throw on next winter's preparedness program. At the same time, with many thousands of dollars now invested in switch heaters of various kinds, this equipment should be carefully dismantled, cleaned, painted or otherwise protected and stored in a secure place, so that it will be readily available and in good condition for reuse next winter.

These may seem to some like elementary suggestions, but in view of the pressure of many other duties on maintenance of way field officers in getting their spring and summer work programs under way, they are not out of order as a reminder that, unless attended to at the present time, there will certainly be regrets in the fall.

Pennsylvania Lays Rail Under Traffic—Without

A NEW practice in laying rail has been developed recently on the Western Region of the Pennsylvania, in which the rail is laid under traffic without slow orders and the track is kept ready at all times for the passage of trains at full speed as soon as closure is made. This practice marks a further development in the laying of rail with large specialized gangs equipped with power machines, some of which cannot be removed readily from the track. It is also a departure from the former practice on this road of diverting traffic on multiple-track lines to permit rail and surfacing gangs to proceed without interruption during the working period of the day.

Traffic Not Diverted

In carrying out the rail program for 1938 on the Western Region, 16 miles of 131-lb. rail was laid on the eastbound track between Hobart, Ind., and Valparaiso, releasing 130-lb. P. S. rail laid in 1924. This section of the line, which is double track, carries a traffic of considerable density, for, in addition to a heavy freight movement, 33 passenger trains are scheduled, 8 of which pass eastbound and 4 westbound during the working period of the day. Owing to the frequency of trains in both directions, it was impracticable to divert traffic and operate over a single track around the rail gang, while shortened schedules made delays to any trains undesirable. Obviously, therefore, the organization and operation of this gang differed in important respects from those formerly in effect when using a rail train,* and for this reason will be described in some detail.

It was the former practice to "kill" the track upon which the rail was to be laid, diverting traffic around the gang during the working period of the day, and thus permitting the rail to be laid without interruption and all of the released material to be picked up currently. It was estimated that this practice reduced the occupancy of the track by the rail gang and work train by at least 50 per cent, compared with the time required to perform separately the several tasks of unloading, laying and picking up the old material. Since conditions in this case did not permit the diversion of traffic, it became necessary to organize the work along entirely different lines, although the method of performing the individual tasks differed little from usual practices. It was necessary, however, to give more than the usual careful attention to certain features of the work.

Careful Planning

Usually the gang was given the use of the track for periods varying from 1½ to 3 hours, at the end of which time it was required that all equipment be in the clear and that the track be ready for full speed. Ordinarily the foreman was not informed as to when or for how long he would be allowed to occupy the track until shortly before the permission was given. This made it necessary to plan and conduct the work with unusual care to insure the best utilization of the time allowed. Under these circumstances, the turnouts and the derails at interlockings were skipped by

*The organization and methods followed when using a rail train were described by R. W. E. Bowler in a paper presented before the Roadmasters' Association in 1930, and published on page 440 of the October, 1930, issue of *Railway Engineering and Maintenance*.

Left—A Spike Pulling Machine in Operation. Below—One Man Rolls the Rail Out with a Rail Fork and One Man with a Claw Bar Pulls Any Spikes Missed by the Spike Pulling Machines—Lower Right—Three Men with Spuds Driving the Tie Plugs Into the Ties

t Slow Orders

The Crane Crew Consisted of an Operator and Three Men

This article deals with the organization and operation of a large, fully mechanized rail-laying gang on the Western Region of the Pennsylvania, which differs in several respects from former organizations and methods of operation on this road in that the rail was laid under traffic without slow orders. This procedure was followed because the much higher scheduled speeds of trains, as compared with a few years ago, require that conditions causing train delays be eliminated whenever it is possible to do so

the rail gang and left for the division forces to install as soon as the rail gang passed.

Since the bases of the new and old rail differed in width, the tie plates and anti-creepers were replaced with new material, so that all ties were adzed. The new intermediate tie plates are flat bottom and of the double-shoulder design, 7½ in. by 14¾ in. in area, 13/16 in. thick and having a cant of 1 in 40. The joint plates are the Pennsylvania standard two-tie design. The intermediate plates have 6-hole punching, four for the rail spikes and two for the independent fastenings. The standard calls for two rail spikes and the two lag spikes for each tie plate on tangents. The two rail spikes were driven as the rail was laid, but the lag spikes were driven later by a follow-up gang.

Six-hole, 36-in. symmetrical joint bars of a special controlled-bearing design, not yet standard on the Pennsylvania, were applied to the new rail. Six anti-creepers were applied to the panel to prevent creepage in the direction of traffic, except at turnouts, railway crossings at grade and elsewhere when necessary, where additional anchors were applied to prevent creepage in either direction.

General Organization

It is the general practice on the Pennsylvania to lay the line rail during the first half of the working day, and to lay that on the gage side during the second half so that the rails on both sides of the track correspond at the close of each day. The standards on this road do not permit the laying of one rail one day and the other rail the next.

The gang, which was a regional one, was housed in the usual outfit cars, 25 cars being assigned for this purpose, five of which were flat cars upon which the equipment was held in place by means of clamps when being transferred from one job to another. Circus-type unloading from one end of the series of flat cars was used and the rail crane was first off and last on in unloading and loading respectively.

All rail and track material to be used was unloaded well in advance by a work train with two derricks and a gang of 20 men. With this train it was possible to unload in one day all of the material needed for the renewal of three miles of rail. The new material was unloaded exactly in the amount needed, with no surplus, and when the unloading had progressed far enough in advance, the train began loading the old rail, and picking up and classifying other released material. An advance gang of

Right—Four Men with "Scratchers" Raked Away Ballast To Prevent Fouling of the Adzing Machine Bits —Extreme Right—Two of the Four Adzing Machines in Operation

Left—Two Men with a Barrel of Creosote and a Spray Brush Paint the Newly Adzed Surfaces of the Ties with Creosote and Four Men Place the New Tie and Joint Plates—Below—Two Men Were Kept Busy Sharpening Bits for the Four Adzing Machines

ten men was also employed in cribbing out the ballast between the ties to prevent the fouling of the adzing bits. When necessary, other men were sent ahead to dig out crossings.

Laying the Rail

The entire operation was under the direct supervision of a general foreman, who reported to the supervisor of track and the division engineer. Under the general foreman were four foremen, the detailed supervision of the various operations being subdivided into four groups, one under each of these foremen. These groups followed each other so closely in the actual performance of their work that there was no apparent separation between them.

The men under the first foreman included principally those operating the bolt-stripping machines and the spike-pulling machines, and in detail their operations were as follows: One man removed the anti-creepers from the old rail, another man pulled joint spikes with a claw bar, three men threw the new tie plates into the center of the track, and two men with two bolting machines removed the nuts from the joint bolts. Next came nine men with three spike-pulling machines, each handled by an operator and two men. Four men followed the spike-pulling machines with a supply train, composed of a battery of motor-car trailers and push cars coupled, distributing spikes, bolts, spring washers, anti-creepers, etc., in the center of the track at the points where they were to be used, and one man with an acetylene torch served by tanks carried on the last push car of the supply train, burned off frozen bolts which the bolt machines could not strip.

The second foreman was in charge of a group of men including principally the pluggers and adzers, which operated as follows: One man with a claw bar pulled any spikes missed by the spike-pulling machines. Two men with light sledges broke the bond wires, loosened the joint bars and threw them out on the shoulder of the roadbed. One man with a rail fork rolled the old rails out on the ballast shoulder, and two men picked up the old plates and threw them on the shoulder of the roadbed. Three men plugged the old spike holes with tie plugs, and four men with hooks or scratchers, made from worn-out ballast forks, raked out any ballast remaining between the ties, which might be high enough to interfere with the operation of the adzing machines. Two or three men with spuds, consisting of a flat steel base with an upright wooden handle, drove down the tie plugs, and two men with a punch and sledge drove down broken spike tubs. One man with a broom swept the ties clean and four men with four adzing machines followed, adzing the ties. In addition to the men operating the adzing machines, two men were assigned to these machines, who removed and replaced adzing heads, and made any adjustments which were necessary.

The men under the third foreman, including the rail-crane crew and the rear bolt-tightening machine operator, were organized as follows: Two men, one with a small barrel of creosote on a dolly and the other operating a creosote-sprayer brush, applied creosote to the freshly adzed surfaces of the ties; three men placed the new tie plates on the ties, and one man placed the large joint plates. Immediately following was a rail crane, the crew of which consisted of an operator and three men, one of whom handled the rail tongs, while the other two stationed themselves at each end of the rail to guide it into place. Whenever necessary, as the rail was lifted, the man at the head end struck it on the base with a light sledge to shake off loose dirt, cinders, etc. As the rail was lowered into place by the

Left Above—One of the Power Bolting Machines in action—Left—Division Forces with Two Rail Bonding Drills Applied Signal Bonds as Fast as the Track Was Laid so that Signals Were in Operation when the Track Was Cleared for Traffic

crane, the man at the rear placed a shim of the proper thickness between the rail ends. Two trailers were coupled to the rear of the crane, on one of which a small gasoline-motor driven grinder was mounted for sharpening the bits of the adzing heads. Two men on these cars picked up the adzing heads left by the adzing machine operators, removed and sharpened the bits, reassembled the heads and returned them to the machines. This unit was followed by one man with a bucket of black oil and a brush to oil the rail ends under the joint bars, two men greasing track bolts with wood-flour grease, one man placing the joint bars at the rail ends, four men applying the bars and starting the nuts on the bolts, two men with a bolting machine tightening the bolts, and two men straightening the new tie plates to insure proper seating of the rail on the plates when spiked in place.

Care in Gaging and Spiking

The fourth foreman, who was in charge of the gaging, spiking and cleaning up operations, supervised the following men: Five sets of gagers of three men each with spike mauls, gages and lining bars, gaging every fifth tie; six men with spike mauls setting spikes for the spike drivers; and seven men driving the spikes with pneumatic spike drivers. The crew of the spike-driving unit was composed of one machine operator, four men operating the spike drivers, and two relief men. Four men using the pneumatic spike drivers were able to complete the spiking of a 39-ft. rail on the average in 35 to 40 seconds. When not driving spikes, the relief men were engaged in driving by hand spikes missed or driven improperly, tightening by hand the one bolt in each joint that could not be tightened by the bolt machine because of interference by the large two-tie joint plates, drilling bolt holes and completing or correcting any other work necessary.

As the gang reached the point of closure, one bolt machine and part of the men were sent back by pre-arrangement, with surplus tools carried on the motor car supply train, to aid in spiking, applying anti-creepers, etc. At the point of closure, the end of the old rail was built up by welding to a running surface with the new rail. The man who burned off the frozen bolts performed this task.

The spiking of the gaging crews was watched closely to see that good line was obtained, and that the gage rail was spiked to exact gage. In spiking the line rail, short kinks that may have existed previously were lined out. It was considered important that the men set the spikes for the pneumatic spike drivers vertical and firmly in position, so that they would not tip if the first blows were not centered exactly. In addition, care was taken to insure that the pneumatic spike drivers were handled properly by skilled men so that the precautions taken in gaging to secure good line and gage would not be nullified, and that improperly driven spikes were kept to the minimum.

Advantage was taken of the fact that the railway is paralleled by a paved highway, to utilize a division motor truck for sending tools, repair parts and supplies of all kinds from one part of the gang to another when necessary; to transfer men occasionally, and to deliver lunch from the camp commissary to the men on the job. The truck was also used to return men left on the track to finish the work after closure. In this manner it was possible to leave six or eight men to finish up a small amount of work, thus allowing the rest of the gang and equipment to leave in ample time to clear the track on schedule for trains.

In addition to the force enumer-

(Continued on page 297)

Right—One of the Gaging Crews Followed by Six Men Setting Spikes for the Spike Drivers —Below—A Rear View of the Spike Setters, Showing a Foreman Checking the Line of the Rail Ahead where the Gaging Crews Are Working

Right Above—The Spike Driving Crew with a Compressor and Four Pneumatic Spike Drivers Completed the Spiking—Right —The Gang Was Transported to and From the Work on Trailers Hauled by the Rail Crane and Motor Cars

The Weed Burner Has Been Used Effectively by Many Roads

How About Weeds?

By W. H. HILLIS

Engineer Maintenance of Way, Chicago, Rock Island & Pacific

With the limited attention that has been given in recent years to the control or eradication of weeds along the track and right-of-way, many roads face an aggravated problem during the coming and succeeding summers. Recognizing this, the author discusses the various methods available for controlling or eradicating weed growth and calls for greater attention to this problem in the interest of lower general track maintenance costs

THE problem of weed control and eradication is one of long standing for maintenance of way men, the severity of which varies with climatic conditions, the type of ballast and the importance of the line involved. On important highspeed main lines, almost complete eradication of weeds is desirable, while on less important lines there may be proportionately decreased efforts toward weed control.

What Justification?

Vast sums of money are spent yearly by the railways to secure effective and economic control over weeds. Without regard to their relative importance, let us analyze the more tangible benefits to be derived from this type of expenditure. In the first place, sizable expenditures are made for the purchase of improved types of ballast to secure the highest degree of drainage efficiency in order to provide the stable track structure that is so necessary to carry the heavy axle loads of cars and locomotives and to meet the high speeds of today. Weedy track encourages the accumulation of dirt in the track, which, sooner or later, results in a puddled condition of the ballast, and in this way destroys one of the prime benefits sought from the improved ballast.

There is also an indeterminate amount of damage to rail and fastenings due to the impediment to proper drainage caused by vegetation. Lack of good drainage also increases the process of tie decay. Likewise, weedy track prevents the attainment of full efficiency of train operation, and, if permitted to become aggravated, results in loss of tonnage, burned rails and flat spots on locomotive wheels due to slipping, and, not infrequently, in serious delay and expense because of slipping on grades, requiring doubling.

We all appreciate that weedy track and uncut brush on the right-of-way present an unkempt appearance which is not pleasing to the traveling public. In this day of high-speed streamlined trains, this is more important than ever. Good housekeeping impresses our patrons, results in increased favorable comment, and in this way assists in attracting additional rail traffic.

The elimination of weeds also stimulates the morale of employees, as clean track encourages the men to engage in their work with increased interest and efficiency. These are the most important items which justify the expense for weed eradication, but there are many others which have a direct or indirect effect.

Hand Work in Past

Considerable progress has been made in the various methods employed in eradicating weeds, including burning, chemical treatment, discing, steaming and mowing. Several years ago, hand labor was the common agency to eradicate weeds. Low labor costs, together with large section forces and shorter sections, permitted the removal or cutting of weeds to a large extent in connection with other regular work, and the general idea prevailed that the removal of weeds did not result in much additional expense. Starting about June 1, and, depending upon the growth of the weeds, the right-of-way was cut in its entirety from fence to fence, scythes being used for a considerable part of this work. Ordinary mowing machines were hired or otherwise secured from farmers adjacent to the railway, when not employed at the time by the farmers.

After mowing the right-of-way, the section forces would start at one

*Presented before the meeting of the Maintenance of Way Club of Chicago held on February 27.

end of their section and spot up and line the track, toe up the ballast section, and weed the track to get this work completed and out of the way by early fall. This practice permitted going into the winter with the best possible track conditions. The ballast was free of weeds and, at the same time, ditches and cut slopes were clear of brush. This reduced the potential difficulty of handling snow during the winter months, particularly in northern territories, since it is a known fact that weeds in the track and adjacent ditches act as a foundation for snow and frequently result in difficult train operation.

In earlier days, in rock ballast, it was necessary to do practically all weed removal work by hand. Later, scuffle hoes were put to successful use in gravel, cinders and ballast of a similar type, thus effecting a reduction in cost over hand pulling. The cost of removing weeds from rock ballast by hand was approximately $50 to $60 a mile, whereas the removal of weeds from gravel ballast, and ballast of similar character, was between $40 and $45 a mile. These figures are based on the wages in effect some time ago; similar costs today would probably run between $75 and $100 a mile.

Weed Burners

One of the first steps in reducing the labor costs of eliminating weeds was the development and use of the weed burner, which consists generally of one of two types—(a) the oven type, and (b) the extended burner type. In the oven type of burner the flames and heat are confined within the area of a hood, which is approximately eight feet long by nine feet wide. The extended type of burner, on the other hand, consists of two or more burners on extended arms, the physical location and density of the weed growth determining the number of arms used. Frequently, these early burners were pulled by a locomotive in a work train. Later, self-propelled weed burners were developed, which eliminated the work train expense and required only a pilot, in addition to the maintenance crew.

In its initial development stage, the use of the weed burner was restricted to branch lines to a large extent, owing to the streaking effect which it had on the ballast. However, improved burners have largely eliminated this objection, thus permitting their operation over important main tracks.

To secure the most desirable results from the use of weed burners, double burning should be employed. In this regard, it has been found economical and good practice to operate weed burners tandem, where possible. Operating the second burner a sufficient number of days behind the first produces the most desirable results in that it eliminates the regrowth of vegetation which sometimes occurs when a single burner alone is used.

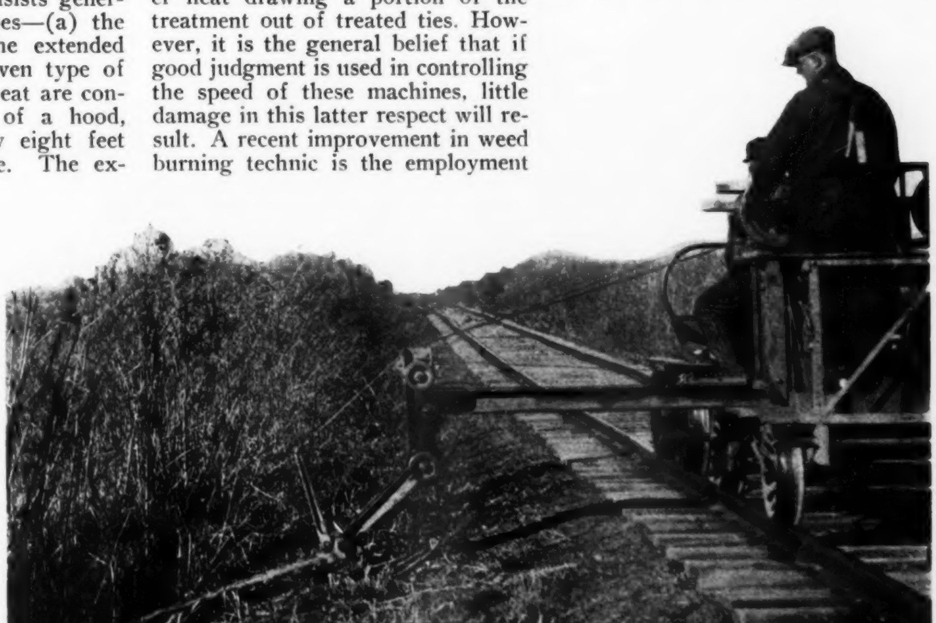
The principal objection to the operation of the weed burner is the fire hazard involved, which makes it necessary for section men to follow up the machine and put out any incipient fires. Objection has also been raised to the possibility of the burner heat drawing a portion of the treatment out of treated ties. However, it is the general belief that if good judgment is used in controlling the speed of these machines, little damage in this latter respect will result. A recent improvement in weed burning technic is the employment of a water car, operated independently directly behind the burner as a safeguard against fire damage.

Temporary results are obtained from the use of weed burners, as only the tops of the weeds and grasses are destroyed, leaving the roots unharmed. The most favorable time to kill weeds by this method is when they are young and tender and full of sap. On many lines this method of removing vegetation is considered economical because of the low cost involved, which is estimated at $5 to $9 a mile.

Weed Mowers

Coincident with the weed burner, the weed mower was developed, with a cutter bar on one side for cutting a swath five to seven feet wide outside of the ballast line. Later, these machines were equipped with an extension bar which permitted the cutting of a second swath extending to a point approximately 10 ft. from the center of the track. This type of machine necessitates two or three trips over the same territory during a season.

Still further mechanical improvements in these machines now permit the cutting of weeds on both sides of the track simultaneously, and on almost any angle. Depending upon traffic and the rankness of the weed growth, from 15 to 35 miles of track can be covered daily with a modern machine, with a crew consisting of an operator and three or four men.



Modern Track Mowers Reach Far From the Ballast Line, Cut on Any Angle of Slope and Can Mow on Both Sides of the Track at the Same Time

If the mowers are available, it is desirable to operate them tandem fashion—the first machine cutting a narrow swath and the second machine, equipped with an extension bar, cutting the second swath to the desired width. The economy of this practice lies in the elimination of one set of flagmen, together with the fact that when the two machines are operated the same day the weeds cut by the first machine do not have an opportunity to dry out to the point where they tend to clog the cutter bar of the second mower and retard its operation.

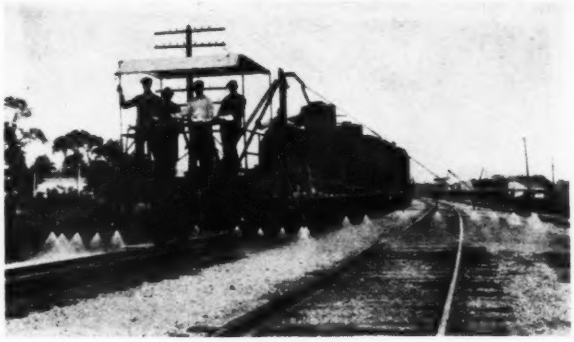
To secure the most satisfactory results with weed mowers, it is necessary to have men precede them to remove any obstacles which might interfere with their operation, and to set up markers for any hidden obstructions which cannot be removed. Mowers should be operated in advance of weed burners. The cost of mowing is approximately two dollars a mile.

The development of off-track mowing machines is highly desirable and some progress has been made toward perfecting a machine of this type. So far, however, it has been difficult to develop a machine which is adapted to cutting weeds along the shoulder, as the width of the standard shoulder ordinarily does not permit the operation of a machine independent of the ballast line. Power-mowing machines have been developed for cutting the right-of-way, and these should result in increased efficiency and economy as compared with the cost of hand work.

Discing

Discing machines have been used successfully and extensively in the fight against weeds. The heavy discer of today is self-propelled, with facilities to enable the operator to work the discs at any desired height. These machines are constructed with three to five discs, which cover the entire ballast shoulder. One disc cuts the ballast away from the ends of the ties, casting the material outward, while the following discs loosen the ballast further and restore it to its original section. Ballast discing not only retards weed growth, but improves drainage by breaking up any dam effect at the ends of the ties.

The use of ballast discers is confined principally to cinder, gravel or other similar types of ballast, and where a severely cemented condition exists, it may be necessary to make two or three trips over the track to secure effective results. Discer operation on secondary lines is particularly advantageous, as the work can be performed economically and at the same time improve drainage conditions. The principal objection to the use of this type of machine on important main lines where first class ballast is used is that it has a tendency to mix dirt with the expensive ballast, which, of course, is not desirable. The cost of operating discers averages $2 to $5 a mile, depending upon the amount of work involved.

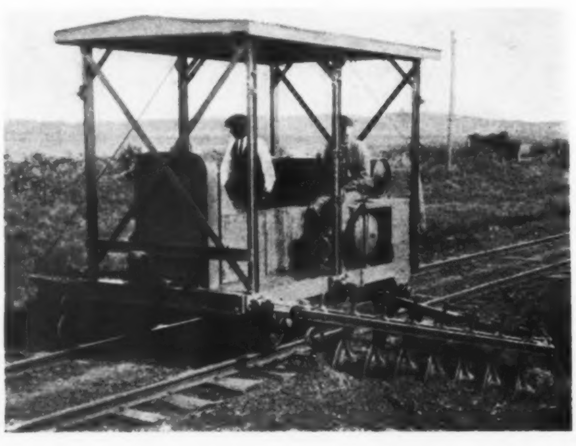


Chemical Weed Killing is Highly Effective and Tends to Sterilize the Roadbed Against Further Growth

Steam Weeding

Weed steamers or scalders were introduced about the same time as weed burners. This equipment consists of a hood about eight feet wide by ten feet long, fastened underneath a flat car, with canvas flaps to direct the steam on the track proper. The steam is supplied from the locomotive used to propel the car. The action of the superheated steam upon the plant growth is merely to cook or wither the tops, without destroying the roots. The withered vegetation remains in the roadbed, and to improve appearances a considerable amount of hand work is required.

From information available, the results obtained from the steaming method are comparable to those of the first pass of the weed burner, and the number of trips necessary each year is dependent upon the density of the vegetation. The cost of this method varies from $7 to $12 a mile.



Discing Not Only Retards Weed Growth, but Also Improves Drainage

Chemical Killing

In more recent years, the science of chemistry has been enrolled in the ever-present battle of weed control. Both poisonous and non-poisonous chemicals have been employed, and, prior to 1930, were used extensively over a large portion of the principal main lines of the country. The poisonous chemical was used to a greater extent than the non-poisonous type because of its lower cost and possible cumulative effect in discouraging weed growth over a period of years. In some instances the poisonous and non-poisonous chemicals have been used in conjunction with each other, the poisonous chemical being used generally between stations and the non-poisonous through station grounds where there is the greater possibility of livestock coming in contact with the treated grass or weeds.

In the chemical method, the chemicals are distributed by means of a spray car equipped with nozzles possessing a quick shut-off feature, and also a main shut-off valve to be used when approaching bridges, road crossings, etc. This car is pulled in a work train with the necessary tank

cars, the equipment, together with an experienced operator, being furnished generally by the chemical manufacturer. While the cost of the first application of chemical in this manner is much higher than that of other types of weed destroyers, the results obtained are of a more permanent character.

The costs of destroying weeds with chemicals are extremely variable, but, generally range from $28 to $35 a mile for the first application, where non-poisonous chemical is used, and from $12 to $20 a mile where poisonous chemical is used.

Use of Oil

Distillate and creosote have been used extensively for controlling weeds and have given favorable results. The equipment employed with these materials involves a spray car, tank cars containing the creosote and distillate, and the necessary piping, fittings and equipment for mixing and distributing the oils. The usual solution employed is composed of nine parts of distillate and one part of creosote. The use of this solution, particularly in the dust bowl territory, has the dual advantage of destroying and discouraging weed growth and of settling the dust. To secure the most effective results with these oils, they should be applied when the weeds are young and tender. This type of weed control costs from $10 to $15 a mile.

Conclusions

Every maintenance of way man is familiar with the varied problem of weed eradication and control and realizes that it must be approached with due regard to the importance of the line, ballast, climatic conditions, and the general policy of each individual railway. With the advent of the depression and the necessity for the curtailment of maintenance of way expenses, weed eradication has been deferred more or less, but with such means as remain within our economic reach we must combat this problem in a progressive and economical manner. By some, the elimination of weeds is considered a luxury. However, it is my opinion that weed eradication has a very definite and favorable effect on the cost of general track maintenance.

The Off-Track Tractor Mower Has a Wide Range of Effectiveness

Laying Rail Without Slow Orders

(Continued from page 293)

ated, there were two flagmen, one conductor acting as a pilot, and three division signal men. The signal men were equipped with two power bonding drills, and applied the signal bonds to the new rails as fast as they were laid, so that, when the track was cleared by the rail gang, the signals were in operation. These bonding men usually worked directly behind the rear bolting machine.

While emphasis was placed primarily on the quality of the work, the necessity for laying as much rail as possible in the short intervals during which the track was available, made it necessary to carry on the operation with the greatest possible speed consistent with good work. As a consequence, the entire organization was keyed up to the point where it was not uncommon to lay as many as 80 to 95 rails per hour.

Follow-Up Operations

In accordance with Pennsylvania practice, the bolts were retightened within three days, again one week later and, finally, one month after the rail was laid, and the rail gang was followed by a small gang of six men tamping loose or hanging ties and checking the gage to insure that it was perfect throughout. This unit was followed in turn by a small gang driving the additional spikes with pneumatic spike drivers. In addition, immediately after the rail was laid, the ends were beveled and the joints were surface ground to correct differences in the height. As soon as the old rail and fastenings were loaded, four 16-tool pneumatic tamping units were started and the track was raised out of face from 1 to 1½ in. Finally, the new rail-grinding car developed on the Pennsylvania for removing corrugations was operated over stretches which showed corrugations or pitting.

A novel development in the equipment used by this gang was the creosote spraying brush, with which two men applied creosote uniformly to the freshly-adzed surfaces of the ties as fast as one swipe of the brush could be made over each tie. This brush was similar in shape to a heavy scrub brush, but with soft bristles, and was approximately the width of an average tie. It had a handle of such length that it could be operated by a man when standing upright, and was fed at the top of the brush with a continuous stream of creosote by means of a small hose from the creosote barrel on the dolly. Pressure was maintained in this barrel by means of a bicycle pump.

The use of a rail fork for turning the old rail out of the track, by means of which one man performed the work ordinarily done by two men with bars was another feature of this organization. This fork had a head which could grip the base, head or web.

The use of wood-flour grease on the bolts is a development which is considered effective in preventing frozen or rusted bolts. The bucket containing this grease had a short section of pipe fastened in the center with its axis vertical, the inside diameter of which was slightly larger than that of the bolts. The bolts were dipped into the grease through this pipe and withdrawn with just the right amount of grease coated uniformly upon them.

The controlled-bearing joint bars used on this rail do not fit against the web of the rail and for this reason when the bolts were tightened they were apt to be "cocked" instead of vertical, with the upper edge of the bars in contact with the head of the rail but too far in; conversely, the lower edge of the bar bearing on the base of the rail was likely to be too far out. To prevent this, a shim was used by the men tightening bolts with the rear bolt machine to insure a vertical position for the bars. This shim consisted of a double hook of steel, hinged in the middle, which hung over both sides of the head of the rail, with short prongs of the proper thickness fitting against the upper part of the web of the rail. When this shim was placed over the rail with the prongs inserted between the bars and the web of the rail, it held the upper part of the bars at the proper distance from the web of the rail as the bolts were tightened, thus insuring a vertical position for the bars.

What Has Been Learned From Treated Timber

During the last 14 years, the Baltimore and Ohio has treated approximately 90,000,000 ft. b.m. of structural timber, of which more than 49,000,000 ft. b.m. were preframed. In this paper, which was presented before the annual convention of American Wood-Preservers' Association in Washington, D. C., on January 25, the author describes the development of timber treating and preframing on his road, and points out the many advantages which have accrued as a result

By P. PETRI
Chief Engineer Maintenance, Baltimore & Ohio

ALTHOUGH treated structural timber was used in isolated instances on the Baltimore & Ohio prior to 1924, its adoption on a large scale did not begin until 1924 and did not become general until 1925. Since that time practically all timber and piling used in bridges and trestles (except for purely temporary use) and most of the structural timber in docks and piers has been treated. A considerable amount of treated timber has also been used in buildings, but this has been for special purposes or to meet local conditions.

The decision to treat structural timber was based upon favorable results obtained by other roads and upon our own experience in the extensive use of treated cross and switch ties. It was also realized that if we were to obtain maximum benefit from treatment, it would be necessary to preframe the timber, as far as this was practicable, and our progress in the treatment of timber has been attended by a parallel development in methods and programs for framing work.

The use of structural treated timber by the Baltimore & Ohio has, therefore, been on a sufficiently large scale for a period of 14 years to enable us to draw some definite conclusions as to its merits. We cannot, of course, determine, as yet, the ultimate average life of such timber, but we can safely state that we have already obtained a sufficient increase in life over that of untreated timber to justify the cost. In addition, we have considerably improved our methods of framing, and have developed a greater variety of uses for treated timber, as well as the utilization of lower grades of timber.

Prior to 1924, our use of timber for bridge and dock work was confined generally to three kinds of wood, namely, fir, white oak and long leaf pine, and while the bulk of our requirements for such uses is still in these woods, we are now using red oak as well as white, a lower grade of long leaf pine and a considerable quantity of short leaf pine, the latter principally for guard timbers, joists, walkways and platforms. This has brought about a large saving in initial cost, and in our opinion has been done without any sacrifice in the life expectancy or structural design.

The Development of Preframing

Closely associated with the treatment of structural timbers is the practice of framing before treatment, or preframing as it is generally expressed. It is becoming increasingly evident that although the life of timber is greatly prolonged by treatment, still longer life can be obtained by reducing the amount of framing in the field to a minimum. Such evidence of decay as we have observed in treated timber has almost invariably originated in surfaces on which the treated wood has been removed by framing. In fact, we do not know of any case where decay originated on or under an undisturbed treated surface. Therefore, preframing is an important adjunct of our treatment.

In a paper presented before this association in 1928, Earl Stimson, then chief engineer maintenance of the Baltimore & Ohio, outlined the general arrangement of the framing mill at our treating plant at Green Spring, W. Va., the scope of work and the direct economies which had been realized.** Our experience since that time has served to confirm his conclusions, and to increase our knowledge of the results which may be obtained.

When we started the treatment of structural timber on an extensive scale in 1925, and for several years thereafter, our production varied from 8,000,000 to 9,000,000 ft. b.m. per annum, of which approximately 50 per cent passed through the framing mill. This timber, which received at least some degree of preframing, consisted principally of bridge ties; guard timber and walkway joists which were completely framed; trestle stringers and caps, which were sized and cut to length; and miscellaneous trestle timber, which was merely cut to length. Further study of both field and mill practices and refinements in methods of obtaining necessary field measurements have now enabled us to increase greatly the extent of preframing in the mill, so that at the present time approximately two-thirds of our total treated production passes through the mill. We are now in position not only to preframe completely all bridge deck material, but also all trestle material with the exception of longitudinal bracing, for which boring is omitted to permit greater latitude in field erection. For spot renewals of such members as stringers and posts, boring is also usually omitted.

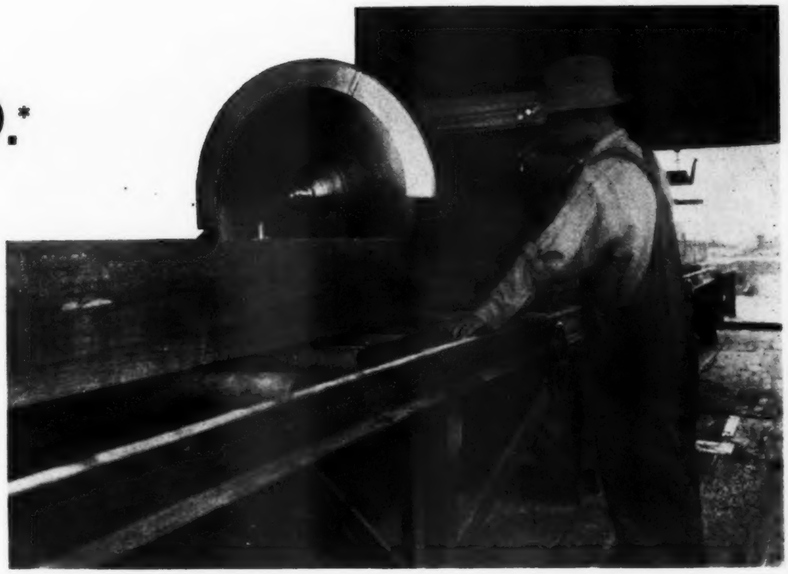
We are also now in position to do a large amount of preframing of timber for miscellaneous uses and it might be mentioned in this connection that we have completely preframed the timber for four large transfer bridges, all members of which were fully cut and bored and all chord members completely assembled before treatment.*** These structures involved about 75,000 ft. b.m. of timber each, and the work done at the mill, including all framing and partial assembly, cost $15 per M. This performance compares with a field cost of $35 to $40 per M. for similar work formerly done at bridge sites. This is mentioned here as an indication of the scope of work possible and the actual direct savings to be obtained, in addi-

*A paper presented before the convention of the American Wood-Preservers Association at Washington, D. C., on January 25.

**This paper was reprinted in the issue of *Railway Engineering and Maintenance* for February, 1928, page 57.

***The last of these transfer bridges is described in the issue of *Railway Engineering and Maintenance* for October, 1938, page 604.

on the B. & O.*



tion to the indirect benefit involved from the better protection of the treated timber.

As a further indication of the development in the character of framing handled, attention is drawn to the following comparison. In the 1928 paper above referred to, Mr. Stimson quoted figures on the total mill output for 1927, amounting to 5,138,295 ft. b.m., of which approximately 50 per cent consisted of bridge deck material, 40 per cent stringers and caps and slightly over 10 per cent of miscellaneous framing. For the year 1937 the total mill output was 3,695,592 ft. b.m. Of this, 1,501,146 ft. b.m. represented bridge deck material, 446,446 ft. b.m. stringers and caps, and 1,748,000 ft. b.m. miscellaneous framing. It is to be observed that with the more diversified use of the mill there was a decrease of about one-third in the total output in this ten-year period. In our opinion, this was due primarily to the benefits being derived from the longer life of treated timber, rather than on account of the curtailment of maintenance renewals.

Before leaving the subject of framing, it may be mentioned that we have been able to enlarge the scope of our work with only slight increase in the

More Than 49,000,000 Ft.B.M. of Structural Timber Has Been Preframed on the B. & O. During the Last 14 Years

Left—Part of the Interior of the Main Mill Building of the Baltimore & Ohio's Pre-framing Plant at Green Spring, W. Va., Showing Large Gaining Machine, Cross Cut Saw, Saw Gummer and Conveyors

Below—Looking Through the Working Shed Adjoining the Mill Building at the Baltimore & Ohio's Preframing Plant at Green Spring, W. Va., Showing Unloading Skids, Band Saws, Saw Mill and Roller Conveyor

framing plant. We have added a few portable tools, such as saws and boring machines; also two band saws, one small 2-in. saw for light cutting and one large one for the cutting of heavy timber and re-saw work, to permit better utilization of timber stock and for reclaiming work.

It has previously been mentioned that we are now using treated timber to some extent in buildings. Such use is generally confined to foundation material, but we have placed treated material in such structures as engine houses, principally for roof framing and sheathing, also for pit timbers and jacking plank. In addition, we have used a large amount of treated timber in crib and bulkhead walls. Both secondhand and new timber have been so used and in several instances, by careful designs we have completely precut and bored the crib members for such walls.

Recent Developments

One of the major developments in our treating practice has been the change in kind of treatment of bridge ties and other deck material for open deck steel bridges. To minimize the fire hazard on such bridges, we changed, in 1933, from creosote treatment of timber for this use, to treatment with Wolman salts. Owing to the comparatively short period that this material has been used, we are not yet in position to determine its comparative merits as a preservative, but it undoubtedly has a fire resistant value and on that account we have also used it in such building work as engine house roofs, previously referred to.

Among the minor developments in our treatment procedure may be mentioned the use of anti-splitting devices, particularly for oak bridge ties and timber. Owing to conditions that have existed for several years, it has been impracticable in many instances to obtain the desired amount of seasoning for our timber, and the necessity for its treatment while still fairly green has in some instances resulted in excessive splitting and checking of the timber after treatment. On account of the character of the Wolman salts treatment, this condition is intensified. As a result we have now adopted a policy of placing drive dowels in all oak ties during the framing process and using similar dowels in other timber when conditions indicate this to be desirable. The added cost is quite small, averaging about 3 to 4 cents per dowel, and it is believed that a greatly improved condition of timber subsequent to treatment results therefrom.

In conclusion, during the 14 years in which we have been using treated timber for structural purposes on an extensive scale, we have treated and used approximately 90,000,000 ft. b.m. of timber, of which over 49,000,000 ft. b.m. was preframed. We are convinced that the timber so treated has an expectation of life much in excess of that of untreated material.

We know also that the preframing at a central point, which has developed as a corollary of treatment, has produced direct savings of many thousands of dollars annually. The fact that our average cost of mill work, including all overhead and indirect charges has been only $5.28 per M. ft. b.m. is proof of this statement.

Practical Measures to Prevent Soft Spots*

By F. T. Darrow

Chief Engineer, Chicago, Burlington & Quincy, Chicago

THERE are two phases of this subject, namely, the preparation of the roadbed on new work, before the track is laid, so that soft spots will not be formed later; and prevention and relief of soft spots under operated tracks. The factors which affect the formation of soft spots, assuming rainfall and heavy traffic loading, are: (1) Kind of soil; (2) compaction or stability of the roadbed; (3) the presence of water in the form of rain, surface flow, subsoil flow, or saturation of the soil; (4) drainage, or lack of it; and (5) elevation of the grade line.

Since the prevention or cure of soft spots can be accomplished only by the removal or correction of the conditions that have caused them, careful analysis of the conditions surrounding each case is desirable before an effort is made to remedy them. For this reason we may consider several illustrative cases.

In the first case the roadbed in both cuts and fills consisted of clay or shale. The climate was dry and windy, with no shade, no top soil, no vegetation and a quick surface runoff. There was no suggestion of conditions that might lead to soft spots, but they developed as the ballast retained the infrequent rainfall on the impervious subgrade. The cure was effected by removal of the earth shoulders of the roadbed to a depth of four feet or more below the rail and replacement with porous material, such as gravel, coarse sand, crushed stone, etc., without removal of the track. This permitted enough aeration and evaporation in the ballast to stabilize the roadbed.

A Long Fill Gave Trouble

In another instance a single-track fill, 12 ft. high, composed of dry clay loam, located in a dry climate, required a slow order for years, and finally caused a bad derailment. The cure was effected by cutting the shoulders of the fill as steep and as close to the ties as was possible; to a depth somewhat below the bottom of the trouble, and then restoring the shoulder with sand before the passage of trains. This work extended for several miles and has been effective.

In still another case the single track was supported on a fill of red clay adjoining a brick-yard clay pit. After it had been in operation for 55 years the track was very rough and heaved, although there was 3 ft. of ballast. Parallel trenches were dug on both sides of the track to a depth of 2 ft. below the ballast. These trenches were filled with wood and coal which were allowed to burn for 30 days, changing the plastic clay into a stable brick-like material.

At another place a soft spot about 60 ft. long developed in a clay roadbed in a 4-ft. cut, and continued application of ballast did not help matters. Finally, the track was removed and a clamshell was used to excavate to an underlying stratum of dry sand. The hole was then back-filled with gravel and the track was restored, effecting a complete cure.

A side-hill fill near a clay cut gave trouble for years. As ballast was added the earth shoulder was moved out and a parallel stream removed the slope to an average inclination

*This discussion was submitted for publication in the What's the Answer department of an earlier issue, as an answer to a question on how to prevent soft spots in the roadbed. Because of its scope, it was withheld for presentation here as an independent article.

of 3 to 1 to a height of 30 ft. Daily application of riprap finally became necessary. Borings showed moist soil on the upper shoulder only 1 or 2 ft. below the surface, but the material was so impervious that the moisture could not escape by drainage, evaporation or aeration. The borings also showed that the ballast pocket, 8 to 10 ft. deep, was filled with water. In this case a cure was effected by driving a tunnel from the creek to the ballast pocket and installing a 24-in. drainage line. When the water was fully drained out of the ballast, the roadbed became stable.

A short but high approach fill to a steel bridge was constructed with clay from an adjacent cut. It was located on a side-hill slope on which the top soil overlaid a black-shale ledge to a depth of 3 or 4 ft. After many years a slow but increasing movement of the embankment began, which eventually affected the piers and bridge so that it became necessary to carry some of the spans on falsework. The clay cover of the impervious shale also moved, this movement being the result of the steep slope of the surface of the shale stratum and a small amount of seepage water which followed this surface. Eventually the falsework was affected to the extent that it became endangered. Borings were made to determine the underground conditions fully. Finally, a large culvert was built to care for the waterway, sand being used for filling over the culvert and closing the bridge opening. In doing this the structure was buried in the fill. The approach fill was then stabilized by tunneling longitudinally along the upper toe of the fill, the excavation reaching about 1 ft. into the shale to catch the underflow, and transverse drains were run from the tunnel into the deep ballast bed.

A similar case in a high clay fill having a deep ballast pocket, was treated by sinking a vertical shaft through the pocket to the culvert. Side drains were then driven from the shaft to penetrate the ballast pocket. The drainage thus provided stabilized the roadbed.

As a final illustration, a summit cut was wet by reason of a water-bearing stratum of fine sand at the track level. This line had been in operation for many years but a soft spot had evidently developed soon after the line was placed in service, for rock had been added many years ago until enough had been placed to stabilize the roadbed. Tiling was also added to carry the surplus water away and the condition in this cut gave no further trouble.

These examples of soft spots and their cure have been given to illustrate the wide variety of conditions under which soft spots developed. It will be noted that one or more of the five factors mentioned in the beginning were present in every case cited. These were soft spots that developed after the lines were placed in operation, and they demonstrate quite clearly that, regardless of other factors, water was always at the bottom of the trouble, and that while an equally wide variety of methods were employed to effect a cure, they all included some form of drainage to dispose of the unwanted water.

Much Depends Upon Construction

A study of the cases that have been cited will also disclose that in most of them proper action on the part of the construction forces would have prevented the development of the soft spots after the lines were placed in operation. To illustrate the extent to which it is possible for the construction forces to take action that will forestall the later development of soft spots, a few cases of this kind will be cited.

In 1936, during the construction of a cut-off line, a moist spot appeared in a cut while the grading was under way. As the grade was below the bottom of a draw, ditches were built along the upper side of the cut to divert the water from the draw. When this was done the moist spot dried out, but as an added precaution the subgrade was rolled thoroughly before the track was laid.

During the progress of a line change that was made in 1937, muskeg was encountered. Conditions were investigated by borings and the location was modified slightly to obtain a crossing at the most advantageous point. The muskeg material was excavated to a depth of about 10 ft. to a firm bottom, and wasted. The excavation was then filled with sound material which was compacted in 1-ft. layers, and the subgrade has remained stable.

Miscellaneous Cases Cited

In a number of instances where summit cuts have been through clay, with water-bearing strata of fine sand close to the level of the subgrade, tile or other forms of drainage have been installed ahead of the track laying. In other cases, excavation has been carried to about 2 ft. below subgrade for the full width of the cut. Track was then laid and rock was hauled in by train and dumped, the track being raised to grade on this material, after which it was given the required lift on ballast. This rock roadbed has held perfectly, even where slides have occurred that brought mud to the top of the rail.

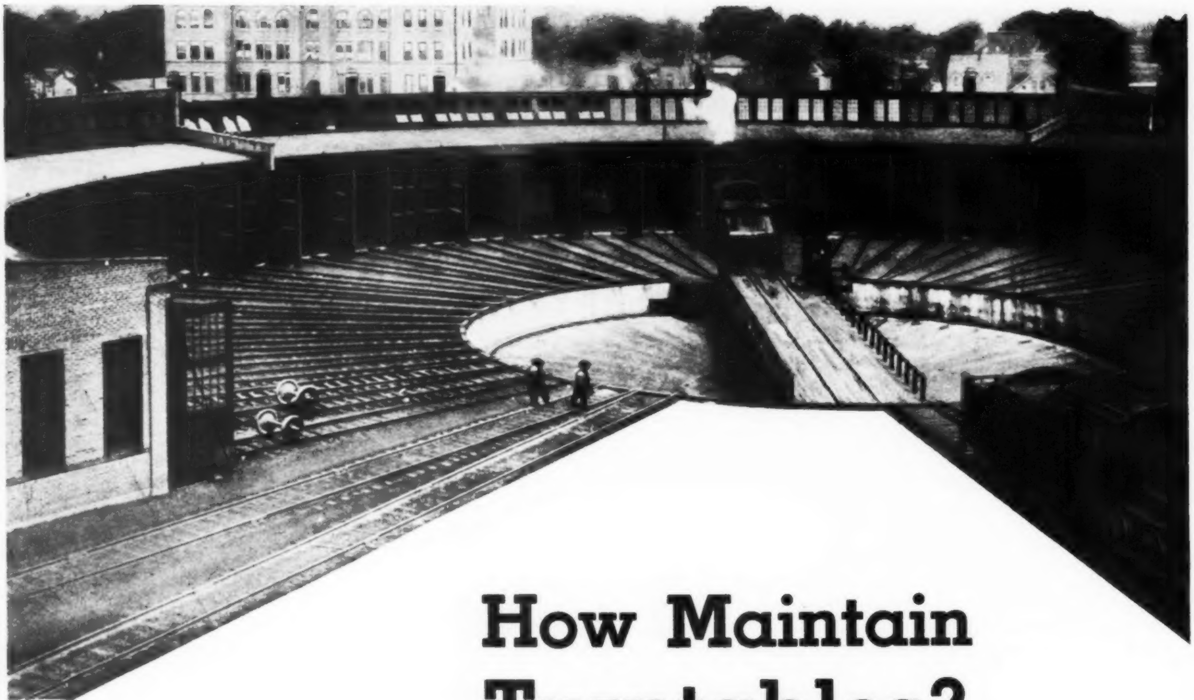
In a project involving the expansion of a yard, in which eight tracks, each 4,500 ft. long, were built on a level grade, the fill, ranging from 4 to 6 ft., was constructed of a soft, salty silt. The embankment was completed to 1 ft. below grade and after the tracks were laid sand was hauled 30 miles to bring the subgrade to final elevation, and the tracks were ballasted. French drains were built across the yard at 500-ft. intervals, reaching to the original ground. These drained the water out of the sand "sponge" layers, and the results have been excellent.

It is standard practice to crown the roadbed for single and double track, and this is all that is required in many cases. Much relating to roadbed may be learned from the tests of the Bureau of Public Roads and from the practices and tests of various state highway departments, particularly with reference to the compaction of filling material in thin layers as a part of the grading operations.

The field of oiling or treating the roadbed with bituminous products to shed rainfall and thus prevent water from entering the subgrade is still open and but little explored. The possibility exists that such treatment may be beneficial where the roadbed must be constructed of material that is available, but not of the most desirable quality. Again, there may be possibilities in the injection of cement grout as a cure for unstable roadbed conditions where certain kinds of materials have been used, or in its injection into sub-ballast.

Another means of development for improving roadbed conditions when the load-bearing value of the subgrade material is low, is the use of concrete slabs on wood pads. This offers relief or cure under certain conditions.

The foregoing examples have been given to illustrate the many and varied conditions that are encountered during construction and the equally varied methods that can be applied in the prevention of soft spots. It will be noted that, as before stated, the important central feature is water. Almost invariably, the first means of correction must be its removal. Yet conditions under which the water is encountered vary with the location, for which reason every case has its peculiarities that distinguish it from all the others, and each case demands individual study before correction can be applied.



How Maintain Turntables?

Characterizing the turntable as the most abused structure that bridge and building men have to maintain, and among the most important, the author, speaking before a meeting of the Big Four Foremen's Association at Cleveland, Ohio, goes into detail to point out those phases of maintenance which should be given primary consideration. He stresses the importance of frequent inspections and of prompt attention to defects which, if not attended to, might develop into major failures

By C. R. TAGGART

Assistant Supervisor of Bridges and Buildings
Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind.

FEW railway employees, except those directly engaged about busy engine terminals, realize the vital importance of having turntables always in the proper condition to do the work for which they are intended. Consider, if you will, what it would mean to have all the locomotives in a 30- or 40-stall roundhouse tied up because of a sudden turntable failure, with no means of getting them out. If you have never had an experience of this kind, you have really missed something that is more than exciting.

If the failure is really serious and there is no immediate relief in sight, you will find every one, from the superintendent down, getting busy. Fortunately, however, such failures seldom happen. The experiences of every one connected with turntables have taught them the importance of vigilance in seeing that conditions that might cause a failure of this nature do not exist. It might be well to caution all of you, however, that if you ever get a new job on a territory that includes a turntable, you do not neglect the work that should be done on the table. Do not wait to be told to do that work. Make your own inspections regularly and do not depend on some one to find out for you when there is work to be done.

Regular Inspection Important

For your information and guidance our company has set up certain rules to be followed in the maintenance of turntables, which, if adhered to, will prevent turntable trouble. Some employees with little experience in turntable work might have diffculty understanding all of these rules. It is the same with any other kind of work, however; a little thought and study will make clear why certain conditions must be watched to insure that the turntable will continue to function properly.

Everything about a turntable is so important that it is difficult to say which is the most important. Probably regular inspection is the most important rule to follow, watching the turntable center, the circle rail, the trucks, the running rail, and the rail fastenings on the turntable itself and those holding the shore rails.

The roundhouse foreman is instructed to watch the operation of his turntable frequently, and to make certain inspections from time to time. He, or the operators, will frequently find and report conditions which should be taken care of with as little delay as possible. The roundhouse foreman is also instructed to make all necessary repairs to the tractors of the turntable. You will find it well to co-operate with him in this work, and to give him such assistance as your experience with the other parts of the table makes possible. This will give the roundhouse foreman and his men a better idea of what is required.

Bridge and building men are required to perform all of the general maintenance work on turntables, such as repairs to the deck, the circle

wall timbers, the rails on the table and the circle rail. It has been our duty also to maintain the turntable trucks and the center and to do the cleaning and painting of the structural steel. It is the duty of the shop electrician, on the other hand, to take care of the motors and the electric wiring, and the track forces have the responsibility of maintaining the tracks approaching the turntable. However, on the approach tracks, bridge and building men should see that the proper rail elevation is maintained at the turntable wall, and that the rails are properly and securely fastened at that point.

Center Requires Regular Attention

The center pier and center bearing are also very important. The center must be set firmly on an unyielding foundation. If it is not, a large amount of trouble and expense will result. Reports indicate that considerable difficulty has been experienced in the maintenance of center piers.

The operating center is a vital unit of the turntable and requires special attention. This cannot be over-emphasized. The fact that the working parts are inaccessible seems to invite neglect, and if this is done and the center is not given the proper attention, disaster is bound to result. It is essential that the working chamber be kept free from water, dust, soot and other foreign matter, and be kept filled with a good grade of lubricating oil. The foreign matter gets into the working chamber with water from condensation and elsewhere, forms acids which roughen and pit the steel of the plates, rollers and treads.

Do not use an oil with no body, because the tremendous weight on the center plates will push out thin oil and leave nothing for lubrication. The bridge and building foreman should look after these details and see that the proper grade of oil is obtained for this purpose.

The turntable must be lifted to examine the working parts of the center properly and to insure thorough cleaning. It is difficult to say just how often this should be done since service conditions vary so widely. At some terminals this is essential every three or four months, while at other points, one year is not too long. When the cleaning is done, the parts should be washed thoroughly with kerosene and new oil should be added before the weight is put back on the center. The importance of lifting the table periodically and of inspecting its center cannot be stressed too strongly. This is one thing the maintenance foreman should know and not overlook if he desires to avoid trouble.

Old Tables a Problem

In some cases where the older types of tables are being used to handle the heavier equipment, an overloaded condition obviously exists. When inspecting these tables, one will invariably find loose bolts, worn wheels and bearing boxes, worn or broken shafts, dirty packing in bearing boxes and indications of insufficient lubrication. In the case of the older balanced-type tables, there is a tendency to maintain the ends high enough to take care of the deflection of the table under such heavy equipment. This results in heavy pounding on the end trucks. One way to prevent this, to a certain extent at least, is to hold down the speed of equipment moving onto the table. This is beyond the control of the bridge and building foreman, but he can at least make recommendations to the roundhouse foreman.

If your turntables have loose wheels and badly worn journals and trucks, your troubles are really commencing, especially if much of the load of the locomotive is placed on the circle rail. When the weight is placed on a truck wheel that is not perfectly alined to run on the circle rail, the table will turn a few feet, and the pulling load will then become so great that it locks. You can produce a similar effect by turning both front wheels of your automobile inward and then trying to push it. We have found from our experience in maintaining an old balanced-type turntable that was converted into a three-point type, that it pays to build some sort of rigid, yet adjustable, type of bracing device to keep the end trucks properly alined to avoid just such a condition.

Other Detail to Watch

The circle rail should be kept perfectly level, well supported and well anchored. Special effort should also be made to keep the rail the proper distance from the center of the table.

The depth of the table at each end, i.e., the distance from the top of the running rail to the top of the circle rail, should be kept the same. The distance from the top of the circle rail to the top of each shore rail should be kept this same measurement also, so that the entrance from each approach track onto the table will be as smooth as possible, thereby minimizing the pound on the end bearings of the table.

Battered or worn rails at the ends of a table cause damage eventually

Old Tables Present Many Special Problems, Especially Under Severe Winter Conditions

The Operating Center Is a Vital Unit of the Turntable and Requires Regular Attention

and should be repaired or replaced as needed. Steel bearing plates should be provided under the rails on the table and on the top of the pit wall. We have found that the ends of the turntable rails will last much longer if a pair of angle bars is bolted on at each end. These bars not only reinforce the rail ends, but also keep them from being battered down as rapidly.

It is essential that the turntable platform be safe for use at all times. See that the boards are bolted down securely, as a certain amount of walking over the turntable cannot be avoided, and the safest conditions should be maintained.

Our book of rules states that the distance between the approach rails and the turntable rails shall be not less than ½ in. and not more than 1 in. To keep this distance within these limits requires more attention than we are usually able to spare. It does help, however, if the turntable rails are securely anchored on the table, and if the inbound and outbound tracks are properly anchored by the track forces.

The book of rules states also that all tracks leading to the turntable should be kept level and solid for at least 15 ft. back from the turntable wall, and, when possible, that they should be straight for at least 50 ft. from the pit. For long, heavy engines, these distances might well be increased, if possible.

There is no question but that the turntable is the most abused structure that bridge men have to maintain. It is abused through use as well as through lack of inspection and maintenance. Some of you know how difficult it is to get a turntable a sufficient length of time to do even the smallest kind of job. At times, it is essential that some of the work be done promptly. When this is the case, if you cannot arrange with the roundhouse foreman to put the table out of service long enough to do the job, you should ask your supervisor to use his influence, as work that should be done on a turntable promptly is as important as any work that you have to do, and may prevent a serious tie-up. Remember that. Do not put if off.

Distributing Ties For Renewals in Yards*

By A. H. Peterson

Formerly, Roadmaster, Chicago, Milwaukee, St. Paul & Pacific Chicago

FOR ordinary tie renewals in yard tracks it is customary to load the ties on a push car and haul them in with a motor car. Usually, the yard track in question must be restored to service at the end of the day's work, while it is not possible to obtain the use of the track until the morning of the day during which the work is to be done. For these reasons, it is desirable to load enough ties on push cars during the preceding day to keep the gang going on the day the work is to be done. These cars should then be advanced to the nearest track to the work that can be obtained, to reduce delay in getting them in and unloaded.

All ties removed from the track, as well as any new ties that may be left over, must be picked up before the close of the day's work and taken out. In no event should ties, old or new, be left in the intertrack spaces over night, as a switchman or a car checker may fall over them.

Hauling Larger Loads

If the gang is larger, two push cars may be used with two light rails laid across the tops of the cars in a trackwise direction. The ties are then loaded on the steel rails crosswise of the track, it being possible in this way to haul as many as 150 ties in one load. The ties can be unloaded quickly and safely by pushing them off at the side and sliding them to the ground. As the old ties are taken out they can then be loaded in the same manner.

It is seldom possible to unload ties from cars and stock pile them very close to leads that serve the yards in which they are to be installed. They must generally be piled at a considerable distance from the point of use owing to congestion of tracks and lack of sufficient room to give safe clearances. To avoid making more trips than absolutely necessary with push cars loaded with ties, it is advisable, where possible, to haul enough ties in one trip to fill the demands for the day's work. With the ordinary section gang this can easily be done as described, and the distribution can be made quickly and safely.

Where an extra gang is employed the same plan of distribution may be followed. It will be necessary for the section gang to load on the previous day enough ties to get the gang started without delay, but subsequent installments can be brought in from the opposite end of the track, to eliminate running through the men engaged in making the renewals.

If the extra gang is larger, say 50 to 75 men, a locomotive crane can best be used to make the distribution, since it can handle a gondola loaded with ties directly to the track in which they are to be used and unload them exactly where required. This saves handling, compared with unloading them in stock piles some distance away and later reloading them on push cars for movement to the point of use. To avoid tying up revenue equipment, shipping dates for the crossties must be checked closely to insure that there will not be too many cars on hand at one time; and conversely to avoid a shortage. Where the locomotive crane can be made available for a longer period, it can be used to pick up the old ties.

For loading with the crane, the old ties should be piled parallel to the track, 15 to 20 to the pile. One end of the pile should rest on a block to allow the sling to be passed under the pile and attached to the hook. If a sling is not used the hook of the load line can be passed underneath and engaged with the line above the pile.

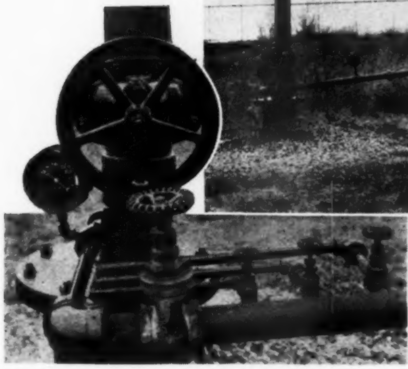
At least one track, and preferably two, in addition to the one in which the renewals are being made, should be cleared for a large tie gang, the middle one being the track to be tied. The new ties can then be placed on top of the rails of one of these tracks, at right angles and opposite the points of insertion. The old ties are then pulled out onto the third track. This gives the gang ample room to work, for track centers in yards are often too close for either safety or convenience where a large number of men are engaged, if both adjacent tracks are occupied with cars which may be moved from time to time.

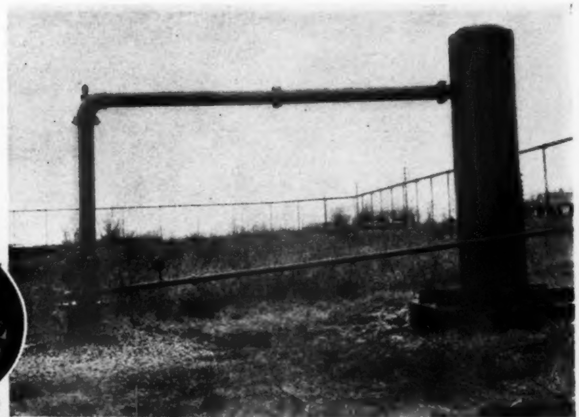
Where it is possible to procure the tracks in advance of the tie renewals, it is advisable to make the distribution on the day prior to the renewals. Usually, however, the tracks can be cleared for one day only, and the work must be done on that day. Ordinarily it is not cleared until just before the gang arrives or, at best, during the preceding night.

*For further discussion of the subject, see page 437 of the July, 1938, issue.

Santa Fe Improves Water Supply

at Shopton, Iowa





Left—Main Valve and By-Pass Valves on Air-Supply Line, With Gage Showing Pressure on Well Side of Control Valves—Above—Shows the Eduction Pipe and Discharge Chamber

Despite its proximity to the Mississippi river, the Atchison, Topeka & Santa Fe, for more than 50 years, has experienced difficulty in obtaining a satisfactory supply of water at its important engine terminal and shop at Shopton, Iowa. After a number of unsuccessful attempts to better the situation, an air-lift well was driven through a water-bearing sand formation, which produced a satisfactory quality of water with a continuous flow of 1,000 gal. per min. This article describes the difficulties that were encountered and the manner in which the problem was solved

DESPITE the fact that the locomotive terminal and shops of the Atchison, Topeka & Santa Fe at Shopton (Fort Madison), Iowa, are located immediately adjacent to the Mississippi river, one of the serious problems confronting the railway at that point has been that of a dependable supply of water for this important terminal. The main tracks lie about 800 ft. north of the original north bank of the river, with the terminal and shops immediately north of them.

Original River Intake

The original means of securing water for these facilities was through an intake well at the river, with a 14-in. suction line to pumps in the powerhouse. Considerable maintenance difficulty was experienced with this intake and suction line because river silt and floating ice caused clogging of the pipe and other damage. The intake and suction line were installed in 1898, and by 1908 had clogged so that it was necessary to augment the supply by purchasing city water.

The difficulties experienced in maintaining the river intake, as well as the water-treating difficulties, caused by high turbidity and rapid change in the chemical characteristics of the river water, led, in 1912, to the installation of 12 small-diameter wells, located on the shop grounds, equipped with fine-mesh screens. These were followed later by the installation of several more wells of the same type. However, the maximum amount of water that could be secured from this source reached only 600 gal. per min. compared with a consumption of 1,000 gal. per min. The fine water-bearing sand formation clogged the wells soon after construction and after several years of expensive maintenance and operation they were abandoned.

In 1913, the Keokuk dam was built across the Mississippi river 20 miles downstream from Shopton. The pool formed by this dam extended several miles upstream from the intake, and the level of the river was raised enough to overflow the original bank and back the water up to the embankment carrying the main tracks. Within a short time after the dam was completed, silt was deposited at the intake well, sufficient to cause trouble with clogging of the pipe.

New Intake Crib

Effort was made to keep the 14-in. intake line open until 1917, when the river end was abandoned and a new wood crib was constructed just outside of the main-line embankment. The purpose of the crib was to provide an intake opening that would exclude ice, drift and other floating debris and that could be kept clear of silt. Sedimentation around the crib occurred rapidly, however, and this, combined with rather wide fluctuations of the water level, especially during the winter months, made it necessary to construct and maintain ditches to lead water to the crib. Under these conditions the water supply was so precarious that it became obvious that a new means of securing water was necessary.

In 1924 a new cast iron intake line, 20 in. in diameter, was constructed at a new location across the flooded low land to the original north bank of the river. This served satisfactorily until 1936, when accumulated silt deposits had reached a level 2 ft. above the top of the intake strainer. This made a total of 6 ft. of silt deposit during the eight-year period since construction. The strainer had been raised as the silt accumulated until it was so close to the water surface that it could not be protected against ice damage. This led to consideration and approval of a plan to extend the 20-in. intake line 500 ft. farther to deeper water.

Air-Lift Gravel Well

Before proceeding with the extension of the intake line, however, it was decided to install a test well on the shop grounds to determine whether, with the newer methods of well construction now available, namely, to replace fine sand with coarse gravel by air-lift pumping and development, it would be practical to obtain a dependable supply of water from the

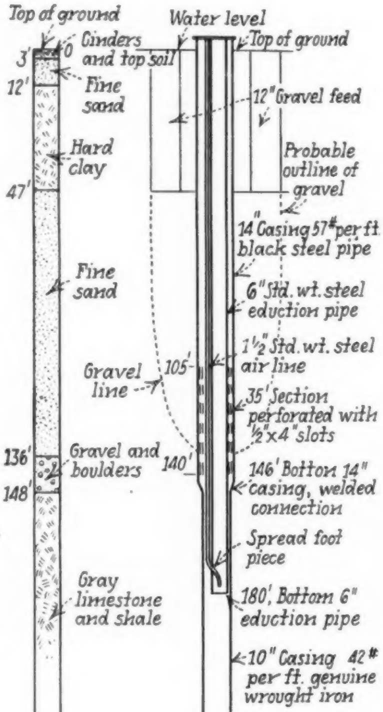
Stone-Walled Reservoir of the Atchison, Topeka & Santa Fe Water Supply at Shopton, Ia.

fine sand stratum which had given so much trouble a few years previously.

A contract was awarded for the construction of a rotary drilled well 306 ft. deep, cased with 14-in. pipe for 146 ft. and 10-in. pipe below this level to a depth of 282 ft. From 282 ft. to 306 ft. the formation was gray limestone and shale without casing pipe. The underground formation was 3 ft. of cinders and top soil, 9 ft. of fine sand and silt, 35 ft. of hard clay, 89 ft. of fine water-bearing sand, 12 ft. of water-bearing gravel and boulders, and then limestone and shale to the bottom of the well.

The fine sand water-bearing formation was the same as encountered in 1912, but instead of attempting to hold it out with a fine-mesh screen, the 14-in. casing was perforated with slots ½-in. wide by 4-in. long for a distance of 35 ft. through the lower part of the fine sand stratum, and the upper part of the coarse gravel and boulders, which, during development of the well, permitted movement of the fine sand into the well where it could be removed by air lift. The rotary drill formed a hole of large diameter through the fine sand, plastering the wall with drilling mud. The hole through the hard clay overlying the sand was too small, however, to permit the feeding of gravel outside of the casing down into the area where the fine sand was being removed, so in order to handle this satisfactorily two 12-in. holes were drilled through the clay on opposite sides of the well, immediately adjacent to the casing.

A 6-in. eduction pipe with a 1½-in. air line was set to a depth of 180 ft. Connections were made to the air line at the top of the well with the air distribution main for the shop terminal. Air was turned into the well at a pressure of 90 lb., causing a discharge of water and fine sand sufficient to require 80 cu. ft. of coarse gravel to replace the sand. The movement of the fine sand into the well continued unabated for several days, but gradually slackened as the gravel reservoir was formed around the well. However, pumping was continued for several weeks before the sand inflow had diminished sufficiently to make it safe to discontinue the development work. The well was completed in December, 1936, at which time a test showed it to be producing 1,000 gal. per min. with an air pressure of 67-lb. A second test late in 1938, after two years of practically continuous pumping, showed no decrease in production. For control of normal pumping, the 1½-in. air-supply line is equipped at the head of the well with three small valves, ¼-in., ⅜-in., and ½-in. in diameter, each in a separate by-pass around the 1½-in. main valve. The present rate of water usage, about 1,000 gal. per min., requires operating the ⅜-in. air valve slightly throttled. The ¼-in. valve gives insufficient air and the ½-in. valve more than is necessary.



Log of Well and Diagram of Well Casing, Eduction Pipe and Air Line

The eduction pipe is carried up about 7 ft. above the top of the well casing and thence horizontally to a 30-in. vertical discharge tank where the water is ejected against a cast iron umbrella head. From this tank the water flows by gravity through a 12-in. pipe line to an open masonry reservoir, from which it is pumped into the distributing system by pumping units located in the powerhouse. Before reaching the storage tanks the water is given a lime-soda ash treatment, bringing the residual hardness to about one grain per gallon.

The unsatisfactory quality of the raw Mississippi river water was due partly to an undesirable amount of dissolved solids and partly to turbidity which could not be cleared up entirely by treatment. Further, the content of incrusting solids in the raw water often changed with such rapidity as to make it impossible to vary the treatment to correspond with these changes.

The water from the well, while somewhat higher in incrustments, is remarkably uniform in chemical char-

Analysis of Water from the Well at Shopton

	Grains per Gal.
Calcium sulphate	Trace
Magnesium sulphate	5.4
Calcium carbonate	13.9
Magnesium carbonate	2.6
Total incrustants	21.9
Sodium chloride	4.2
Sodium sulphate	4.3
Total solids	30.4
Total alkalinity	18.4

Analysis of a Typical Sample of Mississippi River Water at Shopton

	Grains per Gal.
Calcium and magnesium sulphates	1.6
Calcium and magnesium carbonates	16.8
Total incrustants	18.4
Solids in solution	19.0
Suspended matter	0.5 to 30
Total alkalinity	9.6

acteristics, requiring practically no variation in treatment. In addition to this, the water is clear and free from turbidity. The accompanying table shows the analysis of the two waters.

Records show that treatment of the well water costs $0.0015 per thousand gallons more for chemicals than the river water. The treated well water, however, contains about two grains less of hardness than the treated river water.

A portion of the power-plant operating cost is charged to water pumping. When using river water this amounted to a total of approximately $0.01 per thousand gallons of water pumped. Under the present arrangement of pumping water from the well by air, it is calculated that the increase in power-plant operating cost has been $0.0035 per thousand gallons.

The cost of the gravel-treated well, including the 12-in. gravity pipe line to the reservoir, was $9,461 as against the estimated cost of approximately $25,000 for extending the 20-in. intake line 500 ft. to deeper water.

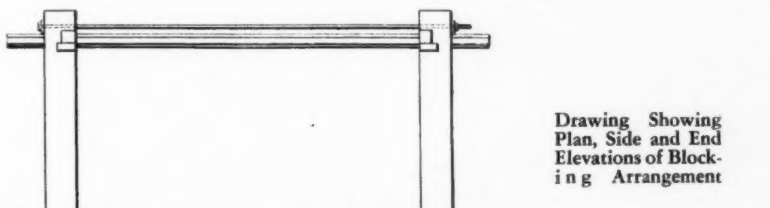
By reference to the drawing it will be noted that the 1½-in. air line from the well is divided shortly before it connects to the foot piece and that the discharge openings are only two in number, placed on opposite sides. Experience has shown that this method of discharging air into the water for lifting purposes is as effective and economical as where it is emitted through numerous small orifices.

The project was developed and constructed under the direction of A. W. Johnson, supervisor of water service, Eastern Lines, and H. W. Wagner, chief engineer.

Blocking Flange-Wheel-Mounted Equipment in Cars

WHEN transporting flange-wheel-mounted work equipment in cars, the tendency of such equipment, especially if without friction brakes, is to shift and tear away from its moorings. The problem which this presents has been solved by the Norfolk & Western as the result of a number of experiments. The difficulty experienced on this road arose primarily with the heavy, flange-wheel-mounted arc-welding generators which it uses for making crossing repairs in the field, and which it transports from place to place in box cars. These machines, which rest while in transit on rails fastened to the car floor, have no friction brakes, and as a result, great difficulty was experienced securing them against longitudinal movement resulting from jerks in normal train operation.

In several attempts to anchor this equipment in cars for transit, one of the first methods employed was to bolt some blocking timbers through the floor of the car as close as possible against the wheels. Owing to the fact that the wheels on the welders had roller bearings and no brakes, however, the welders would gradually roll back and forth in the car during any rough handling, and each successive shock would cut the timbers still further until the machine jumped the track. Another method then tried was to bolt 1-in. turnbuckles to the car floor and fasten them to the drawbar couplings at the ends of the machine, but the shocks in transit broke these turnbuckles. Next, steel rail stops 6 in. high, cut to fit the radius of the wheels, were bolted to the rails, but in one case the wheels climbed over, so this method was discarded.

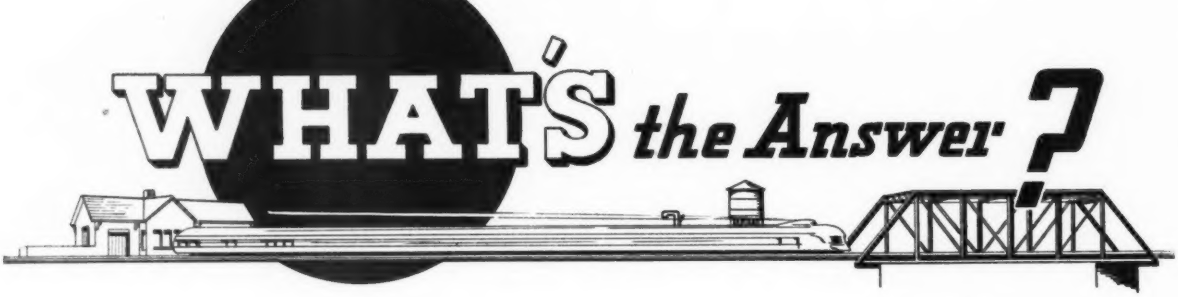


Drawing Showing Plan, Side and End Elevations of Blocking Arrangement

Finally, a plan was developed which consisted in principle of blocking the equipment up on two timbers in such a manner as to remove the weight of the machine from the rails, and substitute sliding friction for rolling friction. In this plan, two 10-in. by 10-in. oak timbers 6 ft. 6 in. long were notched 4¼ in. deep and 5½ in. wide to fit over the rail, so that when placed across the rails they would rest directly on the floor of the car. Two more notches were cut at a 45-deg. angle in the upper corners of each timber to provide inclined bearings for the wheels of the machine. The timbers were then placed across the rails, one at each end of the machine, with the inclined notches bearing against the wheel tread and flange surfaces.

Two steel tie rods, 1 in. in diameter and 11 ft. 6 in. long, threaded on the ends, were then extended horizontally through the ends of the two ties, one on each side of the machine and parallel with the rails. Washers and nuts were applied on their ends, and by tightening the nuts simultaneously on both sides, the timbers were drawn together until all four wheels of the machine were forced upward upon the inclined notches. With this arrangement, all the weight of the machine was removed from the rails and was placed upon the two timbers which, in turn, rested directly on the floor of the car. As a result, when the car was rough handled the timbers would slide a few inches on the floor, reducing the shock to the machine.

This method of anchoring the machines while in transit has proved highly successful and no further trouble has been experienced.



Bolts or Spiking—Which?

When laying rail, should the spiking or the tightening of the bolts be done first? Why?

Tighten Bolts First

By B. R. Kulp
Engineer of Maintenance, Chicago & North Western, Chicago

A better job of laying rail can be accomplished if the joints are bolted securely before the spiking is started. When using power wrenches it is desirable to place and tighten all bolts as soon as the bars are applied, but many times when laying rail by hand it is found expedient to tighten only two bolts, or a sufficient number to hold the joint securely and finish the job under traffic. The primary purpose of the joint is to provide, as nearly as possible, a continuous rail, for which reason the joint bars should be drawn up tight while the rail is free. To tighten the bolts after the rail is spiked down is apt to produce undesirable stresses in the rail or in the joint, because the spikes may hold the adjacent rails so that they do not readily aline themselves.

The gaging of the track, which is the first step in spiking, can be done much more readily with tight joints than with loose joints which make it difficult to hold the rail in line. Obviously, this is not so important on tangents, but on the sharper curves, kinks are likely to result if the rail is gaged before the joint bars have been drawn up tight.

Again, uniform expansion is an important consideration in laying rail, and here again it is necessary that the bolts be tightened as soon as possible after the rail has been laid, to prevent any opening or closing of the expansion until the track is ready for use. In many cases the spiking is finished after the track has been returned to service, in which event it is essential that the bars be tight before train movements are permitted, even if no particular harm is done to the track if the rail has not been fully spiked.

When laying rail through turnouts or complicated switch layouts, there may be some cases where frequent adjustments are called for during the process of making the installation. Because of this requirement, it may not be desirable to apply and tighten all of the bolts prior to spiking. In general, however, the best results will be obtained with the bolts tightened before the spiking is begun.

Holds the Rail in Line

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

When rail is being laid the bolts should be tightened ahead of the spiking. This is particularly important on curves, for well-tightened joint bars will cause the curvature to carry through from one rail to the other, thus making it possible to utilize the flexibility of the steel to provide smooth uniform curvature in the newly laid rail. On tangents, the tightening of the bolts ahead of the spiking holds the rails in line through the joints, thus keeping the most difficult part of the track in line while the rail is being spiked, which, obviously, tends to keep the joints in better line thereafter.

For many years it was the custom to precurve rails before laying them in curves, but experience has proved that rails joined by heavy joint bars that are bolted tightly can be lined to conform to curvature up to 10 deg. without precurving. It has also been demonstrated that this process avoids the short flat spots at the joints that

Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.

To Be Answered in July

1. *When laying rail, what methods can be employed to overcome variations in end height that result from mill tolerances?*

2. *How and by whom should storm windows, stoves and similar winter equipment at stations be stored? Why?*

3. *What sequence of operations should be followed in removing a tie for renewal? When inserting the new one? What are the advantages?*

4. *Where fish in reservoirs become so numerous as to cause trouble at intakes or interfere with pumping, what means can be employed to remedy the situation?*

5. *When the track is to be given a general surfacing, how should one determine the amount of lift required? Does the kind of ballast make any difference?*

6. *What methods should be employed and what precautions should be observed if one is to obtain satisfactory results from the pointing of old stone masonry?*

7. *What is the most practical and economical method of mowing the right-of-way? Does the character of the vegetation or of the ground make any difference?*

8. *How soon after a rain is it safe to paint a frame building? A steel structure? What determines this interval?*

were so characteristic of track laid with precurved rails.

All rail curvers that I have ever seen provide roller contacts at three points, the outer rollers being both on one side of the rail and the third or middle roller being on the other side. The curving of the rail is accomplished by the middle roller, but no curving can commence until all three rollers are in full contact with the rail, and the curving action ceases as soon as the front roller leaves its contact with the rail. For this reason, at each end of the rail, there is a straight uncurved section equal to the distance between the middle and end rollers. Thus, as a consequence of precurving rails, there is a flat spot at each joint. These flat spots can be avoided by bolting the joint bars tightly and thus lining the rails to the desired curvature before the spikes are driven.

Need Not Be Full Bolted

By W. Woolsey
Section Foreman, Illinois Central, Chicago

When laying rail the joint bolts should be tightened before any spiking is done, although it is not essential that the joints be full bolted on tangents and light curves. On sharp curves the joints should be full bolted. If not full bolted, the center bolts at each joint should be drawn tight enough to bring the rail ends to register before any spiking is done. After these bolts are tightened, either preliminary or full spiking can be done as conditions require, and the remaining bolts can be placed and tightened later.

Obviously, the reason for tightening the center bolts before any spiking is done is to make the adjacent rail ends match; otherwise there will be a lip or failure to register which will make it difficult to tighten the joint bars to a good fit, and which will result in undesirable wear on the gage side of the rail at the joint.

Cannot Adjust Later

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

It is especially important that the bolts be tightened ahead of the spiking on sharp curves; otherwise the joints on the outer rail will kink out and those on the inner rail will kink in. After the rail is fully spiked these kinked joints seem to take a permanent set and will always show a tendency to stay out of line. On curves, the rail should be set into the track far enough ahead of the spikers to allow the joints to be tightened, the tie plates to be placed accurately and the rail lined to approximately correct gage before any spiking is done. If the rail gang has been organized properly, there will be no loss of time or of output by reason of tightening all bolts ahead of the spiking. If a considerable amount of rail is to be laid, it will be economical to tighten the bolts with power wrenches, with the added advantage that they assure uniformly tight bolts.

On tangents the rail should be set in as nearly as practicable to gage, placing the tie plates as before. It is then permissible to place and tighten only two bolts, but they should be brought to sufficient tension to avoid lipped joints. The spikers then follow, and behind them the remainder of the bolts are placed and tightened. The main point on both curves and tangents is to get the rails and tie plates accurately into place before they are spiked down. It is an expensive and unsatisfactory job to attempt to straighten rail after it has been spiked into place improperly.

When a Pile Fails

Where a single pile in a bent fails, should it be spliced or replaced? If two piles fail? If more than two? Why? How should the work be done? Does the type of trestle make any difference?

Wishes He Knew the Answer

By H. Austill
Chief Engineer, Mobile & Ohio, St. Louis, Mo.

I wish I knew the answer to this question. Those of us who grew up in the era of untreated piles, when the cost of driving piles and building trestles was moderate in comparison with today, are prone to overlook the present value or cost in place of a pile-trestle bent where the material has been given preservative treatment. When most trestles had only two-ply stringers, and the matter of flagging and delaying trains was considered merely incidental to the day's work of driving piles, and certainly not chargeable to the cost thereof, many trestles were redriven and numerous sound piles were cut off, and the stumps of even many of those that had been classed as defective were found to be quite sound a number of years later.

Today, trestles have three or more stringers under each rail, requiring that they be shifted to permit the new piles to be spaced properly, and all trains are in a hurry, making pile driving an expensive operation. Again, the typical bent of today represents a considerable investment, and its present value should be considered before deciding to replace it. However, the safety of the structure must be the first consideration, and if conditions dictated the use of a pile instead of a framed trestle, it should be maintained as a pile structure.

I consider it to be good practice to splice defective piles until not more than one-third of those in each bent have been cut out. To do this, the bracing on one side of the bent should be removed, the pile should be cut off square about three-feet below the ground line, and a new stick, of nearly the same diameter, should be cut to exact length and forced under the cap. The new stick should be fastened to the stump and cap securely and the bracing should then be reapplied. To fasten the new stick to the stump of the old pile, a successful method is to bore three sloping holes, spaced evenly at about 120 deg. around the stick, and drive dowel pins through the new stick into the old stump.

Where treated piles are used, it happens occasionally that certain piles fail within a few years, but that the remainder are perfectly sound. I believe that where about half of the piles are sound, it is good practice and economical to spot-drive the trestle to replace the failed piles.

This method retains the good piles, maintains the bent spacing and makes it unnecessary to construct a new deck because of the redriving. I have found that the increase in the cost of driving is about 20 per cent per pile driven in this way, compared with redriving the whole trestle with new bent centers, and by so doing a large amount of deck timber is conserved.

It is rarely that the whole deck of a trestle can be shifted longitudinally so that the joints in the stringers will fit the new bents. Again, it is seldom that a very large percentage of the deck timber that is taken out in the process of rebuilding a deck on new bents is reused in a trestle. On the other hand, if a deck is safe to operate over, a large part of it can be continued in service by spot-driving the piles and retaining the original bent

spacing. The economy of this method holds, regardless of the type or character of the trestle.

Would Splice Them

By F. H. Cramer
Assistant Bridge Engineer, Chicago, Burlington & Quincy, Chicago

Where a single pile in a bent fails, and the remainder of the piles and the timber in the bent are fair to good, the proper procedure is to splice the pile. This will also hold true for two failed piles. If more than two have failed, the method to be followed will depend on the condition of the remaining piles and the timber, the number of bents requiring repairs, as well as the height of the structure, the speed of trains, the class of traffic and the cost of the work.

How the work shall be done depends on the condition of the pile at the ground line, around the sway bracing holes and whether there is evidence of splitting at the top. If the failure is confined to the ground line, the pile can be spliced with a good pile stub or a 12-in. by 12-in. or a 14-in. by 14-in. timber of the proper length used. In either event, the old pile stub and the inserted piece should be doweled and held together with side splice timbers or scabs properly bolted to both timbers. If rot and splitting are quite general above the ground line, the entire pile, from cut off to ground line, should be replaced with a long pile stub or timber post. All cut offs should be made to good sound wood. Where two adjacent piles are to be spliced, it is good practice to place a subsill across the pile stubs and set the new posts on this sill, seeing that all timbers are properly doweled and provided with splices or fishing pieces. If only a limited number of the piles in the structure have failed, this method of repair will in no wise affect the safety of the trestle.

Depends on Conditions

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

It is not economical to replace a single pile by driving in any type of trestle. Yet, I do not favor the splicing of any number of piles in a single bent, for when a pile is spliced, a full bearing is seldom obtained at the joints and if treated material is being replaced, a wide area of untreated timber is exposed, without full protection against decay.

It is our practice, when it becomes necessary to replace a single pile, to excavate from 1 to 2 ft. below the surface. The pile is then cut off below the ground and the stub is treated with hot creosote and tar and the same treatment is given to each end of the post that is used for replacement. The butt-joint method of anchoring the post to the pile stub is employed, in which the fishing consists of two 3/8-in. by 3 in. by 2 in. by 2 ft. angles. Finally the excavation is back filled and tamped thoroughly.

The number of piles that may be replaced by posts in each bent is determined by the type of trestle, the class of the line in which the structure is located, the speed of trains and the character and volume of traffic, as well as the alinement. In four-pile bents, if more than two piles are to be removed, they should be redriven or frame bents should be erected. If more than three piles in a six-pile bent are failing, they should also be redriven or a frame bent should be erected. This refers particularly to treated-timber trestles where it is desired to retain the structure in service for a sufficient period to obtain a full return from the preservative treatment.

On the other hand, if the structure is old and the material is untreated, and if it is intended to renew it within a short time, it will be more economical to replace the piles with posts on the pile stubs, provided the number to a bent does not exceed the limits already mentioned. The location of any trestle makes a difference in the amount of stiffening required. This is particularly true with respect to overflow districts and sharp curvature, both of which demand additional bracing, where necessary to reduce the stiffness of the structure repaired by replacing piles with posts.

Sap Up or Sap Down?

Is there any difference in the service life of ties cut in the winter and in the summer? Why?

No Difference

By W. J. Burton
Assistant to Chief Engineer, Missouri Pacific, St. Louis, Mo.

I assume that the question is intended to apply to ties that are to be treated, although the answer will apply to untreated ties equally well. I know of no service-life statistics from which an answer may be deduced, so that it becomes necessary to consider the question in the light of present-day knowledge of the factors that govern the life of ties.

It was thought formerly that timber cut in the winter "when the sap was down," was to be preferred, both because there was less sap to ferment and less moisture in the tie to retard or prevent the penetration of the preservative. We now know that both of these ideas were erroneous. Not only is the sap not "down" in the winter, but the tree may actually contain more water in the wood cells in the winter than in the summer. We also know now that it is the growth of fungi in the material of the cell walls and fibres rather than fermentation of the sap, which causes the loss of strength that we call decay.

However, while the foregoing is not the reason that winter cutting may be preferred, it is true that for certain territories and certain kinds of wood, winter cutting is safer and may be expected to result in fewer early failures of ties. In the winter the spores of the decay-producing organisms are less prevalent and less active, and decay growth is dormant or retarded, so that a tie has a much better chance of getting out of the woods and to the treating-plant seasoning yard without infection or partial decay than a tie cut in warm weather.

It is important that all ties be removed from the woods, where conditions are most favorable for infection and decay growth, as promptly as possible. This necessity is greater in summer than in winter, and is especially so for certain kinds of wood, particularly gumwood. Gum becomes infected and the decay organisms start their destruction of the wood fibres quickly, and for this reason some roads specify winter cutting only for this wood. A winter-cut gum tie is no better, however, than one cut in the summer, provided the latter has not become infected before treatment.

The question may well be asked why winter cutting should not be required for all ties. The answer is that while this might be desirable, if the economic aspects of tie production could be ignored, it is not feasible to do so. The ideal production plan would keep the tie makers employed at tie making throughout the year. To restrict all tie production to the winter months would cost more than the

benefits that might be derived from such a plan. Such a restriction would also upset orderly treatment schedules and result in further increased cost for treatment.

To sum up, the winter-cut tie is less likely to have become weakened through partial decay prior to treatment. On the other hand, proper and prompt handling of summer-cut ties results in equally good ties, and proper and prompt handling is less expensive than it would be to limit tie production to the winter months. However, gum wood may be an exception in certain territories.

Other Factors

By H. E. Herrington
Section Foreman, Minneapolis & St. Louis, Jordan, Minn.

While under certain conditions winter cutting of ties is to be preferred, so many other factors affect the life of the ties that one cannot say with any assurance that ties cut at one season will last longer than if they had been cut at some other time. However, insects and the low forms of plant life that promote decay are inactive during the winter, so that the chances of infection and insect infestation are less likely to occur than in the warm months when these organisms are most active.

Again, during cold weather the wood dries more slowly and, in general, the seasoning is more uniform so that there is less checking and splitting while seasoning. While I prefer winter-cut ties for the reasons given, there is no reason that I know of why summer-cut ties will not have as long life if they are given the care necessary to get them to the seasoning yard before they are infected.

No Better

By Engineer Maintenance of Way

Formerly, the opinion prevailed generally that trees cut in the winter did not contain as much sap as those cut in the summer. This belief has not been substantiated by experiments made in both Europe and the United States. Since the general use of preservative treatment, there is no difference in the service life of ties cut in winter and those cut in the summer. The cutting of timber in the winter has the advantage, however, that insects and the processes of decay are inactive during cold weather. Winter cutting thus permits removal of the ties from the woods and partial seasoning before the decay-producing organisms become active, thus increasing the resistance to infection.

In some sections winter cutting is not always possible, which necessitates cutting at other seasons. Such ties can be and have been produced successfully during any part of the year, provided they are taken out of the woods before they become infected by decay-producing organisms.

Fading and Spotting of Paint

What are the causes of fading and spotting of new paint where the old paint has been burned and scraped from wood surfaces? How can it be prevented?

Uneven Absorption

By William L. Hale
Chief Chemist, The Debevoise Company, Brooklyn, N.Y.

Fading and spotting occur where paint is applied over a wood surface that has been burned and scraped, because of uneven absorption of the new paint. This absorption results in less gloss and areas which absorb the oil may show complete flatting. This difference is pigment wetting, or ratio of pigment to vehicle, results in a color difference as well as earlier failure of the paint. Certain colors show this spotting and fading much more than others, gray or buff being examples, while black or red are affected much less.

When repainting surfaces that have been burned and scraped, it is important to apply a priming coat that is particularly formulated to stop this uneven absorption. At least two coats of paint should be applied to insure a finished job that will give uniform appearance in its degree of gloss.

Not Removed Uniformly

By Frank R. Judd
Engineer of Buildings, Illinois Central, Chicago

Fading or chalking of paint occurs when the linseed oil, a vegetable oil, oxidizes, causing the outer surface of the oil film to perish. This releases the small particles of mineral matter which form the pigment and they are removed by rain and wind. Thus the paint wears down gradually and in time disappears. This form of disintegration is normal and is the desirable way for paint to fail.

Spotting occurs when this disintegration occurs too rapidly over certain areas, causing a spotty appearance. On new wood this occurs by reason of unevenness in the texture of the wood. In repainting work it is the result of not removing the old paint uniformly, so that some parts of the surface become more porous than others. These porous areas absorb a greater amount of oil, thus depriving the pigment of its full allotment of binder, with the result that these areas fade faster than the remainder where less absorption occurred.

To prevent fading and spotting, one should always apply three coats, consisting of a priming coat, a body coat and a finish or wearing coat. One should make sure that the surface is dry before starting to apply paint and that the priming coat fills all of the pores. He should pay special attention to the more porous areas of the surface and choose a season when good weather can be depended on.

Tint and Priming Coat

By General Inspector of Buildings

When removing paint from wood surfaces by means of a torch and scrapper, it is almost impossible to avoid scorching small areas, even where the greatest care is exercised. Then about a year or so later spots will begin to appear, and investigations will disclose that this occurs where the wood was scorched, creating an unsightly appearance. Spotting from this cause is always more noticeable where light paints have been applied than where darker colors have been used. If white lead is used for the priming coat, probably the best means of avoiding the trouble will be to tint the priming coat, adding from one-half to one pint of raw umber to 100 lb. of white lead. This should hide the scorched areas and give a uniform color to the entire surface. As a still further precaution, however, it is well to add to the body coat some of the tinting color that is to be used on the finish coat, making this coat of somewhat lighter shade than the finish color.

Where all of the old paint is not removed, fading may occur over the areas where the old paint remains, if the priming coat is not rich enough in oil, for the old paint can absorb

an astonishing amount of the vehicle, leaving the ratio of pigment to vehicle too high. Then as the succeeding coats are applied, this process of absorption continues and the paint over the old paint areas loses its gloss and begins to fade. In general, however, spotting will appear only over the scorched areas where the burned places show through.

Churning Ballast on Bridges

What causes ballast on ballast-deck bridges to churn? How can this be overcome?

Good Design Essential

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Churning ties can be likened to a plunger in a cylinder, the ballast representing the cylinder and the ties the plunger. If there is to be pumping action, the ties must work up and down in sealed pockets in the ballast. If this action of the ties is eliminated or if the sealed pockets are done away with, the churning will stop. Obviously it is not possible to eliminate the action of the ties entirely, although it can be reduced by allowing the heads of the spikes to stand up slightly from the base of the rail.

The better way is to prevent the ballast from sealing and thus obstructing the free flow of the water which gathers in these pockets. Certain grades of slag and varieties of stone are prone to cement themselves with their own dust and thus seal the ties in waterproof pockets. Such ballast will churn whether on a ballast deck or on ordinary roadbed. Dirt and dust that sift into the ballast from passing trains may also be good cementing materials. For these reasons, the ballast should be hard and resistant to abrasion or disintegration and with sufficient voids to allow the materials that sift in to wash through or blow away.

Crushed hard furnace slag, trap rock and washed gravel having hard pebbles will allow free passage of air and water through them, and will thus be self cleaning to a certain extent. There may be some objection to washed gravel because of its tendency to roll under the ties, but this tendency can be overcome somewhat by deck design.

Whatever the type of ballast, it is essential that the design of the deck shall be such that it will offer no obstruction to drainage, but that it will allow dirty water to flow freely from the ballast. If, for any reason, the ballast becomes foul and thus prevents drainage, it should be removed and replaced with clean ballast of good quality. Thus the whole matter resolves itself into making sure that the deck is designed to pass drainage freely; that suitable ballast with ample voids supports the ties evenly; and that the spikes are allowed to stand slightly above the base of the rail.

Use Good Ballast

By W. Rambo
Roadmaster, Missouri Pacific, Poplar Bluff, Mo.

There are two principal reasons why ballast on ballast-deck bridges churns, the major reason and most common reason being the use of a poor grade of ballast. Only the best grade of ballast is suitable for ballast decks. It should be hard crushed stone ⅜ in. to 1 in. in size, and should contain no fines. If the ballast is too coarse, say up to 2 in., the drainage will be adequate, but it will be difficult to maintain line and surface, particularly on curves, and more particularly where the superelevation is in the bents, for the coarser ballast will tend to shift from beneath the ties. Gravel should never be used on ballast decks.

The second reason is lack of drainage. Shims 1 in. thick should be inserted between the ballast retainers and the decking to provide openings about eight inches long at intervals of every two feet of the length of the bridge. As an added precaution, the floor boards should be laid with spaces about ¼ in. wide between them. On curves, conditions will be much improved if the elevation is placed in the bents, rather than in the ballast.

Keep Drainage Free

By J. Morgan
Retired Supervisor, Central of Georgia, Leeds, Ala.

While there are many sources from which the trouble with churning ballast on ballast decks originates, such as foul ballast, fine material, disintegrating gravel, stone or slag and tight decks, there is only one basic cause, and that is the same as is responsible for churning ballast elsewhere, namely, poor drainage. Ballast on bridges becomes foul because the material was of poor quality in the first place; because too large a proportion is fine; or because dirt sifts in from passing cars.

Only clean hard stone is suitable for ballast-deck bridges, and this should be graded from 1 in. to 1½ in. in size. Stone of this character will not deteriorate, and will contain sufficient voids to insure drainage, carrying with it a considerable part of the fine material that sifts from cars, provided the drainage outlets are of adequate size to permit free flow through them. I prefer stone to slag, for the slag will break up under tamping or disintegrate from exposure and eventually contain considerable fine material that will tend to block drainage.

Inadequate Drainage

By A. D. Kennedy
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

When ballast on ballast-deck bridges becomes foul and churns, the trouble can be traced to inadequate drainage. Renewing the ballast will afford only temporary relief. To secure permanent results, suitable and adequate drainage must be provided. This can be accomplished readily by placing 1-in. shims at intervals between the ballast-curb timbers and the floor. This arrangement allows for drainage at the sides of the deck and is exceptionally effective.

Three Causes

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Three conditions are generally responsible for churning ballast on ballast-deck bridges, any of which, either alone or in combination, is sufficient to start the trouble. The most common cause is dirty ballast; the second is failure to provide openings between the ballast retainers and the floor, or these openings may be of insufficient size to allow for the necessary drainage; and the third is the laying of the floor boards too tight. If openings are not provided between the ballast retainers and the floor, churning will be particularly aggravated on curves where the superelevation is placed in the bents.

Only clean ballast should be applied

on ballast decks, and a hard crushed stone or crushed slag is to be preferred. If the ballast become dirty by reason of droppings from cars, as where ore or coal traffic are heavy, it is advisable to clean it as often as may be necessary.

Filler blocks should be inserted between the ballast retainers and the floor boards in such a way as to allow an opening from six to eight inches long every two feet. These filler blocks should be approximately one inch thick, since this thickness will not allow the ballast to work out between the deck plank and the retainer timbers; yet it is sufficient to drain water away about as rapidly as it can seep through the ballast.

In general, the floor boards should not be laid tight, but with openings about 1/4 in. wide. This opening is sufficient to dispose of drainage and yet will not pass ballast of the proper size. If the floor boards rest on steel stringers, they should be laid tight and drainage holes 3/4 in. in diameter should be bored through the decking between the beams to prevent the water reaching the metal.

Cleaning Windows in Shops

What practical methods and equipment can be employed to clean windows in the sides and monitors of enginehouses and shops?

Not a Serious Problem

By R. E. Candle
Assistant Engineer of Structures, Missouri Pacific Lines, Houston, Tex.

In the damp climate of this region, with the minimum of dust, and because natural gas or oil is used generally for fuel, the cleaning of glass in shops and enginehouses does not present a serious problem. In fact, it is required only infrequently. In our enginehouses and shops, we use horsehair brushes about 6-in. in diameter, with long handles, plenty of water being the only other requirement. A similar brush 2 in. wide and 8 in. long is used to clean the windows in the monitors. A small hose is generally attached to the brush to facilitate the work. After washing, a long rubber wiper is used to remove the water from the glass and polish it. Shop laborers do the cleaning at odd times, and the cost is almost negligible.

Constructed Runways

By Supervisor of Bridges and Buildings

This is a matter that usually causes little concern to the bridge and building forces, for it is the responsibility of the shop and enginehouse forces to keep the windows clean in their respective buildings. As a matter of fact, this is a task that is too often neglected or performed perfunctorily. Recently, however, our management interested itself in the subject, since which there has been considerable window-washing activity.

As usual, the responsible department answered the criticism it received by intimating that it was more or less helpless because of some one else's neglect. In other words, it was stated that the inside surfaces of the monitor and skylight glass were inaccessible, that the outside surfaces were nearly so and that it was also difficult to reach the tops of the windows in the side walls. As a result, we have provided light portable staging that can be used for the side windows and these can now be reached easily by short-handled brushes. The monitors and skylights presented a different problem, however, for ladders were scarcely suitable for reaching the interior surfaces, owing to obstructions on the floor, while it was necessary to move them so frequently because of the limited area that could be reached from them, that it was a time-consuming job to cover the large area of glass surface.

We first considered the placing of plank walkways below the monitor windows and skylights, but it was not easy to support them where they were needed. We then decided on a light structural frame, with safety railing and metal grid floor. This was easily suspended from the roof members and offered little obstruction to the light. For the outside, we simply laid light plank runways on the roof to prevent damage to the roofing, and we require all window washers to wear rubber boots as a further precaution in case they step off of the runways.

Protection Against Corrosion

What practical methods can be employed to protect underground pipe lines against corrosion?

Coat With Coal-Tar Pitch

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Coal-tar pitch is highly resistant to the disintegrating action of water and corrosive elements. For this reason, it makes an ideal covering for underground pipe lines subject to attacks from cinders or other corrosive agents. Pipe lines to be placed underground should be coated on the outside with coal-tar pitch and, if they are to carry corrosive agents, they should also be coated on the inside with pitch. Asphalt is less resistant to moisture than coal-tar pitch.

When repairs are being made to existing pipe lines, the newly laid sections should be coated thoroughly with pitch and that part of the old line that is exposed should be treated in the same manner. If coal-tar pitch is not available, asphalt can be used for the coating with reasonably good results. If neither the pitch nor the asphalt is available, a good grade of clay may retard corrosion to some extent, but eventually the corrosive agent will soak into the clay and attack the pipe. It will be economical to use pipe coated with coal-tar pitch for underground lines that pass through cinders or corrosive soils.

Keeps Them Overhead

By Heating Engineer

It has always been my practice to place pipe lines above ground where practicable to do so. One can waste annually through undiscovered leaks in underground lines, far more than the cost of the insulation that would have been necessary if the line had been placed above ground, while, in general, the cost of the installation above ground is less than that for the same line underground. Again, an overhead line is always easy of access for inspection and repairs, and leaks make themselves apparent almost as soon as they occur. This refers particularly to hot water, air and steam lines up to, say, 6 or 8 in., which, except for cold water lines,

take in the great majority of the pipe lines at water stations, shops, enginehouses, power plants, coach yards, etc.

However, the question refers to underground lines, and the alternative has been mentioned only for the purpose of showing that much difficulty and cost of maintenance as well as waste from leakage can be eliminated by keeping pipe lines above ground wherever this can be done. As every water-service and heating engineer knows, the protection of underground pipe lines against corrosion is difficult, the cost is usually high, and there is little opportunity to learn anything about the effectiveness or life of the protection after the pipe trench has once been back filled.

Experience has shown that some of the materials that are being exploited for this purpose are worthless, although some of them give excellent results when used above ground. Some of these materials have a tendency to absorb water and are thus ineffective; others exhibit a greater affinity for clay than for the metal to which they have been applied and the coating tends to loosen, leaving the pipe without protection. It must not be overlooked also that a material that may give excellent results on an air or cold water line may be completely useless on a steam or hot-water line, and vice versa.

Tar or pitch coatings, such as are used on cast-iron pipe give excellent results if applied properly, but the ordinary field applications have little merit, since the pipe must be hot-dipped in the protective material if the coating is to be of real benefit. Asphalt compounds have also been used with success in some cases while they have failed in others. This illustrates the fact that considerable study of local conditions is necessary before an intelligent decision can be arrived at. Tar paper and tar or asphalt-saturated felt, which have been used at times have proved to be ineffective because they cannot be made to adhere to the pipe. However, as a protective cover for a coating they may be of real value.

One of the best materials with which I am familiar is rust-inhibiting and non-hardening. It can be applied more easily in the field than any other that I have found to be effective, as it is applied like paint after the pipe is in the trench. If the pipe is wrapped with canvas after the application is made the coating will be protected and, while it cannot be expected to last indefinitely, its protective value can be depended on for a longer time than can be expected from any other material except properly applied coal-tar pitch, while it has the important advantage of being rust-inhibiting.

Distance Between Center Stakes

When lining track, what distance between center stakes is most desirable on curves? On Tangents? Why? Should these stakes be permanent? Why?

Three to a Station

By Jack Ausland
Wichita Falls, Tex.

Where the rails are 33 to 39 ft. long, stakes on curves should be set three to a station, to insure at least one stake to a rail. If the foreman has one stake to the rail, he will be able to get the track to exact alinement all of the way around the curve. But if the stakes are set 50 or 100 ft. apart he may leave the joints between them considerably out of line. On tangents, intervals of 200 ft. are satisfactory.

Stakes should not be set permanently on the center line, for few subgrades have sufficient stability to make them dependable. However, I am in favor of setting permanent reference points for the beginning and end of curves and at points on tangents that should be fixed, where they can be placed near the right of way fence or elsewhere where one can be sure that they will not be disturbed. In this connection it should be borne in mind that these reference stakes will not be used frequently and sometimes only at long intervals. Permanent markers or permanent reference points for curves should never be set unless the curve has been chained with the proper temperature correction of 0.01 ft. for each increment of 15 deg. above and below 65 deg., Fahr.

Using 65 deg. as the datum temperature, no curve can be run correctly, or independent measurements at other temperatures be made to check, unless corrections are made for temperature. As an example, at 95 deg., a 100-ft. steel tape will be 0.06 ft. longer than at 5 deg. At 65 deg. a 1 deg. curve having a central angle of 60 deg. will have a radius of 5729.65 ft.; the tangent will be 3308.01 ft.; and the external distance will be 886.36 ft. Using the same tape and measuring these functions of the curve without temperature corrections, the actual distances (not the measured distances) obtained will be radius, 5727.36 ft.; tangent, 3306.69 ft.; and external, 886.02 ft. At 95 deg., without temperature corrections, these distances will be radius, 5730.78 ft.; tangent, 3308.67 ft.; and external, 886.55 ft.

These facts indicate that if the assumed curve is run at 5 deg. it will be 0.53 ft., or 6⅜ in., at the center, outside of the alinement run at 95 deg. At the lower temperature the P.C. and P.T. will each be 2 ft. closer to the point of intersection than if the work was done at the higher temperature. In this case, if the original alinement was run at one of the assumed temperatures and the realinement was done at the other, assuming no temperature corrections in either case, it would be necessary to shift the track from nothing at the ends to a maximum of 6⅜ in. at the center. This may explain some of the difficulties encountered by almost every one who has attempted to realine long curves.

At 39-Ft. Intervals

By Division Engineer

It is our practice to place center stakes on curves at 39-ft. intervals. The stake is placed between two joint ties, in which position it is less likely to be disturbed or lost as a result of the respacing of the ties. On tangents, we space the stakes at intervals of about 400 ft. This is about the maximum distance at which the line tack can be set with the required accuracy when using an ordinary transit. In our work it is not necessary to set the stakes closer together, for our gangs use lining transits when lining tangents.

In accordance with usual practice, we use oak stakes 1¾ in. square and 18-in. long, with 4-in. points, except at points of spiral, points of circular curve and points of compound curve. At these points we establish permanent markers made of 2-in. boiler flues, pointed at one end and fitted with steel caps, 2½ in. by 2½ in. by ⅜ in., welded on top. These markers are stamped B.S. (beginning of spiral), B.C. (beginning of circular curve), E.C. (end of circular curve) and E.S. (end of spiral). The B.S. and E.S. markers are also stamped with an 0, while the B.C. and E.C. markers are stamped with numerals that indicate the inches of superelevation of the curve.

What Our Readers Think

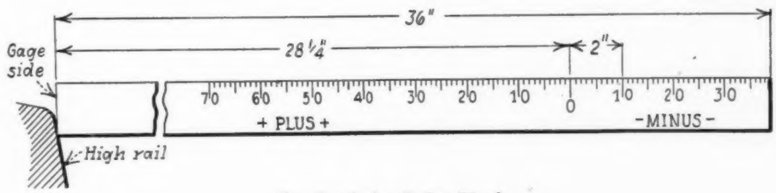
Special Ruler For Lining Curves

Forrest, Ill.

To The Editor:

I am enclosing a drawing of a ruler which I have made for staking curves that have been measured by the string line method, which eliminates the three final computations (doubling the half-throw values, converting the tenths to inches and fractions of an inch, and adding or subtracting to get the exact distance for setting the stake from the rail).

The curve is measured in the usual way with a ruler graduated in tenths of an inch and computations are made in the regular manner, with the exception that the computations end with the column containing the half-throws. The curve is then staked directly from the figures in the half throw column by means of this ruler on which the divisions are twice as large (i.e. one fifth inch) as those on the ruler used to take the original string measurements, and on which the divisions are numbered continuously each way from the zero point, instead of in feet and inches and fractions thereof. The ruler is also marked plus and minus and the sign of the half throw in the computation determines which side of the zero point the stake shall be set.



Sketch of the Ruler Used

This rule, which was made from a yard stick by removing the original marking, saves many mental calculations and possible errors. Similar rulers may be made for curves measured in other units.

R. S. Stephens,
Supervisor, Wabash Ry.

[The use of a ruler on which the divisions are numbered continuously instead of in inches and fractions thereof for the original measurements of the curve to be string lined, would save another step in the string line calculations—that of converting inches and fractions into whole numbers representing eighths or tenths of an inch. A combination method of using such a ruler divided in sixteenths or twentieths of an inch for measuring the curves and another similar to that made by Mr. Stephens, graduated respectively in eighths or tenths of an inch would, in addition to eliminating four calculations, also allow smaller adjustments to be made in the calculations of the curves, and in many cases would permit reducing materially the amount the curve need be thrown.—Editor.]

Employee Activity

Savannah, Ga.

To The Editor:

I have just read with deep interest your excellent editorial entitled "Interest" in the October, 1938, issue, and consider it most timely and vital. On September 23, 1938, a council of employees was formed at Atlanta, Ga., under the name of the Mutual Transportation Committee, the purpose of which is to do the same thing that you discussed in your editorial, that is, to arouse the interest of the rank and file of railway employees. The immediate objective, however, was the elimination of unfair federal subsidized water transportation.

The delegates attending this meeting were largely from the Southeast, but they also came from Illinois, Indiana, and Missouri, and we hope to make the organization nation wide. This movement grew out of a local threat at Savannah, when it was proposed to establish a federal barge line on the Savannah river. A joint committee from the railway employee's clubs undertook to arouse not only the employees of the railways, but the merchants and the general public as well as the city council, and the barge line has not been put into operation. While managements of the railways also opposed this operation, they have given much of the credit for arousing opinion against it to the employees.

Our plan is not to form a new organization, but merely to secure a committee chairman and a secretary in each state, to act as a clearing house for information and to direct activities, working through employee clubs, labor organizations, booster clubs, etc., to influence their representatives in congress to give us a square deal. We would be glad to hear from employees in other states who may be interested.

H. H. Warner,
Acting Secretary, Mutual Transportation Committee.

New Books

Trade Standards

TRADE Standards adopted by Compressed Air Institute. 112 pages, illustrated 8½ in. by 11 in. wire bound imitation leather cover. Published by Compressed Air Institute, 30 West Street, New York. Price $1.00, plus postage

This is the fifth edition of this trade standards booklet. This edition, which is more than double the size of the previous one, has been revised and brought up to date and much new material has been included. Sections have been added on rotary compressors and vacuum pumps, centrifugal compressors and blowers, compressor accessories, rock drills and pneumatic tools and methods of testing displacement compressors, blowers and vacuum pumps conforming to the revised A. S. M. E. code. Much additional data in the form of charts and tables have also been added.

The pamphlet is divided into two parts. The first part, which is of a general nature, treats of definitions, nomenclature and terminology, rating standards, guarantees, trade policies, and test standards of the compressed air industry and the installation, care and lubrication of compressors in general. The section is completed by numerous tables and formulas for calculations in the compressed air field and finally by a list of the uses of compressed air.

The second section deals in detail with the various types of compressors, blowers, vacuum pumps and pneumatic rock drills and other pneumatic tools and of compressor accessories. The pamphlet is well illustrated with many drawings, charts and tables and the subject matter is comprehensively indexed.

No Deaths or Injuries Transporting Explosives

For twelve consecutive years, the railroads of the United States and Canada have transported billions of pounds of high explosives such as, dynamite, black and smokeless powder, explosive ammunition and blasting caps, without a single death or injury. Continuing this record during 1938, approximately one-half billion pounds of such explosives were handled by the railroads in these two countries without an accident, death or injury. Great quantities of other dangerous articles, such as gasoline, acids and corrosive liquids, inflammable liquids and solids, poisonous articles and compressed gases were also transported in 1938 with only one fatality and 31 injured. The one fatality resulted from the derailment of a tank car of gasoline and of the 31 injured, none was serious.

Research on High-Speed Freight Car Trucks

A $45,000 appropriation for a one-year research project on high-speed freight car trucks has been voted by the board of directors of the Association of American Railroads. The project will be carried on under the direction of the A.A.R. Mechanical division. Several different types of high-speed trucks will be installed on cars of a test train and the tests will be conducted on a 150-mile stretch of track between Altoona, Pa., and Lock Haven on the Pennsylvania.

Amlie's Nomination to I.C.C. Withdrawn

President Roosevelt on April 17, sent to the Senate a notice of the withdrawal of the nomination of Thomas R. Amlie to be a member of the Interstate Commerce Commission. Mr. Amlie who was appointed by the President to succeed Commissioner Balthasar H. Meyer, is a Wisconsin Progressive and a former member of the House of Representatives. Opposition in the Senate to Mr. Amlie's appointment was based on charges of radical and communistic sympathies.

Railroads Exhibit at Golden Gate Fair

Occupying a prominent place in the largest building at the San Francisco Golden Gate Exposition, dedicated to the scenic and recreational marvels of the West Coast and known as Vacationland, are the railroad exhibits. The "J. W. Bowker," a locomotive of 1875 which played a historic part in the building of the West, occupies the position of honor. Seven railroads, the Southern Pacific, the Atchison, Topeka & Santa Fe, the Union Pacific, the Chicago & North Western, the Pennsylvania, the Denver & Rio Grande Western and the Western Pacific, together with the Pullman Company and the Railway Express Agency, Inc., have individual exhibits, featuring among many things, rail travel and comforts, model trains and scenic wonders that may be visited on various roads.

New Union Passenger Terminal at Los Angeles, Cal.

On May 7, the Los Angeles Union Passenger Terminal, built jointly by the Southern Pacific, the Atchison, Topeka & Santa Fe and the Union Pacific, at an expenditure in excess of $11,000,000, will be placed in service. The terminal, which will be the finest on the Pacific Coast, is of the stub-end type, with 12 passenger tracks arranged parallel with the main axis of the station and elevated about 17 ft. above the station floor level. Low-level platforms, located between pairs of tracks and protected by butterfly-type sheds of unusual design, are connected to the station proper by a subway.

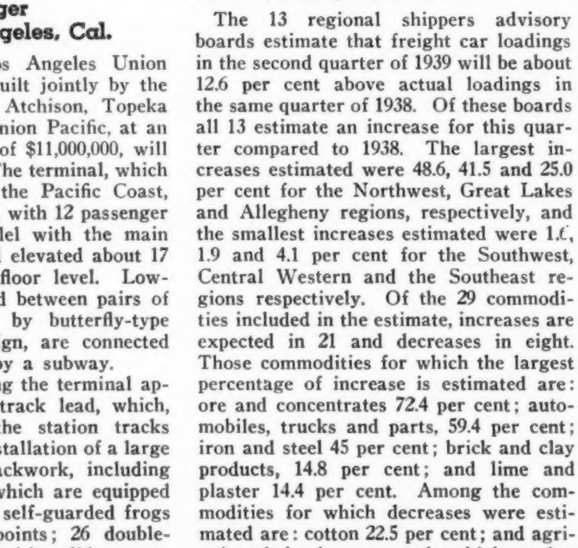
The three roads using the terminal approach it over a six-track lead, which, with the throat to the station tracks proper, involved the installation of a large amount of special trackwork, including 62 turnouts, most of which are equipped with solid manganese, self-guarded frogs and Samson switch points; 26 double-slip switches, largely with solid manganese, self-guarded frogs and Samson points; three solid manganese crossings and one movable-point crossing; and three split wye switches, equipped with oil-buffer type spring switch mechanisms.

The station proper, which faces Alameda street across a broad tropically landscaped area, consists of a number of building units of irregular shape, size and height, which, flanked by arcades and pavilions, have a main frontage of 860 ft. The station is of Mediterranean architecture in white-faced concrete, with colorful decoration and ornamentation on both the exterior and interior.

Traffic Increase Forecast For Second Quarter of 1939

The 13 regional shippers advisory boards estimate that freight car loadings in the second quarter of 1939 will be about 12.6 per cent above actual loadings in the same quarter of 1938. Of these boards all 13 estimate an increase for this quarter compared to 1938. The largest increases estimated were 48.6, 41.5 and 25.0 per cent for the Northwest, Great Lakes and Allegheny regions, respectively, and the smallest increases estimated were 1.6, 1.9 and 4.1 per cent for the Southwest, Central Western and the Southeast regions respectively. Of the 29 commodities included in the estimate, increases are expected in 21 and decreases in eight. Those commodities for which the largest percentage of increase is estimated are: ore and concentrates 72.4 per cent; automobiles, trucks and parts, 59.4 per cent; iron and steel 45 per cent; brick and clay products, 14.8 per cent; and lime and plaster 14.4 per cent. Among the commodities for which decreases were estimated are: cotton 22.5 per cent; and agricultural implements and vehicles other than automobiles 18.2 per cent.

A View of Part of the Terminal Area of the New Los Angeles Union Passenger Terminal Showing the Main Station Building in the Foreground



Association News

Bridge and Building Association

The Proceedings of the October, 1938, convention came from the press late in April and are now being distributed to the members.

Railway Tie Association

The Railway Tie Association will hold its 21st annual convention at the Hotel Netherland Plaza, Cincinnati, Ohio, on May 23-24. The program will be confined to the consideration of the reports of committees on the Checking and Splitting of Ties, Standard Adzing and Boring, Timber Conservation, Changes in Dimensions of Cross Ties during the Seasoning Period, Moisture Gradient as a Determining Factor in the Treatment of Cross Ties and on Manufacturing Practices. The Committee on Moisture Gradient is expected to recommend a standard method for determining the moisture gradient, while the Committee on Manufacturing Practice is accumulating data showing different methods employed in manufacturing cross ties, including end trimming, etc. The association will hold its annual banquet on Tuesday evening, May 23.

American Railway Engineering Association

Three committees of the association held meetings during April, as follows: Buildings, at Cleveland, on April 18 and 19; Water Service, Fire Protection and Sanitation, at Chicago, on April 25; and Maintenance of Way Work Equipment, at Chicago, on April 25. Only three committees have as yet scheduled meetings for May, these being the Committee on Iron and Steel Structures, which will meet at Columbus, Ohio, on May 4 and 5, the Committee on Economics of Railway Labor, which will meet in Omaha, Neb., on May 4, 5 and 6, and the Committee on Track, which will meet at Chicago on May 17.

Work on the 1939 Proceedings is advancing satisfactorily and this volume will be available to members early in June, followed shortly by the lose-leaf supplements to the Manual, embodying changes and additions approved at the convention in March.

Maintenance of Way Club of Chicago

One hundred eighteen members and guests attended the annual meeting of the club at the Auditorium Hotel on April 24. At this meeting, which was preceded by a reception and dinner, John A. Gillies, assistant general manager, Eastern district, Eastern lines, of the Atchison, Topeka & Santa Fe, discussed The Essentials of an Efficient Rail-Laying Organization, as Seen by an Executive Officer.

In the annual election of officers which followed the dinner, G. M. O'Rourke, district engineer, Illinois Central, was advanced to president; H. R. Clarke, engineer maintenance of way, Chicago, Burlington & Quincy, was advanced from second vice-president to first vice-president; W. H. Hillis, engineer maintenance of way, Chicago, Rock Island & Pacific, was elected second vice-president; and N. D. Howard, managing editor, *Railway Engineering and Maintenance,* was re-elected secretary-treasurer. V. G. Walling, division superintendent, Chicago Surface Lines; F. G. Campbell, assistant chief engineer, Elgin, Joliet & Eastern; and E. W. Backus, sales engineer, The Rail Joint Company, were elected directors for a term of two years. The membership at the end of the year was 230.

Metropolitan Track Supervisors Club

At a meeting held at the Hotel McAlpin, New York, on April 13, which was attended by 66 members and guests, John V. Neubert, chief engineer maintenance of way, New York Central System, spoke on the development of the track structure. Following Mr. Neubert's address, the club gave consideration to a number of important items of business. Acting on a proposal that had been before the club for some time, it was decided to change the name of the organization to the Metropolitan Maintenance of Way Club.

Next ,the election of officers was held, in which T. F. Langan, supervisor of track, Delaware, Lackawanna & Western, was advanced from first vice-president to president; P. N. Wilson, superintendent of maintenance, Brooklyn-Manhattan Transit Lines, was elevated from second vice-president to first vice-president; J. J. Clutz, supervisor of track, Pennsylvania, was elected second vice-president; and W. E. Bugbee, Eastern Railway Supplies, was elected secretary-treasurer. Members elected to the Executive committee are J. P. Ensign (retiring president), assistant engineer of track, New York Central; J. M. Reardon, supervisor of track, New York, New Haven & Hartford; Arthur Price, supervisor of track, Erie; and C. C. Connolly, American Fork & Hoe Co. The election of officers at this meeting is a departure from the previous practice of conducting this item of business at the annual outing. The Outing committee reported that it had chosen June 29 as the date for the annual outing, and that this function would again be held at the Houvenkopf Country Club, Suffern, N.Y.

Things You Should Know About Your Roof—This is the title of a 26-page booklet, 8½ in. by 11 in., which has been issued by the Johns-Manville Corporation, New York, to disseminate information on the correct construction and maintenance of industrial type roofs. This booklet describes and effectively illustrates how roofing felts should be laid, how flashing should be applied, how the joints in the coping should be protected, and how the roofing and flashing should be placed around drains, skylights and angle supports. In addition, it points out the advantages of insulating certain types of roof decks, and illustrates a considerable number of roofs of the built-up type that have been in service for 20 years or more.

Personal Mention

General

C. D. Merrill, an engineer by training and experience, and superintendent of the Wilkes-Barre division of the Pennsylvania, with headquarters at Sunbury, Pa., has been promoted to superintendent of stations and transfers, Eastern Region, with headquarters at Philadelphia, Pa., and **R. W. Sheffer,** division engineer of the Pittsburgh division, has been advanced to superintendent of the Wilkes-Barre division, with headquarters at Sunbury, succeeding Mr. Merrill.

J. P. Jackson, assistant superintendent of the Scioto division of the Norfolk & Western, with headquarters at Portsmouth, Ohio, and an engineer by training and experience, has been promoted to superintendent of the Shenandoah division, with headquarters at Roanoke, Va., and **J. W. Neikirk,** roadmaster of the Radford division, with headquarters at Roanoke, has been advanced to assistant superintendent at Portsmouth, replacing Mr. Jackson.

J. P. Jackson

Mr. Jackson began his railroad career as a rodman in the engineering department in June, 1924. Five years later he was promoted to assistant roadmaster on the Radford division and on November 1, 1933, was transferred to Lynchburg, Va., as acting roadmaster on the Norfolk division, becoming roadmaster in the following year. Mr. Jackson was appointed assistant superintendent of the Shenandoah division in October, 1935, and served in that capacity until March, 1938, when he was transferred to the Scioto division as assistant superintendent, the position he held until his recent appointment.

George F. Walter, supervisor of freight service of the New York Zone of the Pennsylvania, and an engineer by training and experience, has been promoted to superintendent of the New York Zone of the Pennsylvania and of the Long Island, with headquarters at New York. Mr. Walter was born at Easton, Pa., on April 13, 1888, and graduated in civil engineering from Lafayette College in 1909. He

entered the service of the Lehigh Valley at Easton in June, 1909, as a rodman in the engineering corps, resigning in December, 1909, to enter the service of the

George F. Walter

Pennsylvania as a chainman. After serving as chainman, rodman, transitman, assistant supervisor and supervisor of track at various points on the Lines East of Pittsburgh, Mr. Walter was appointed assistant trainmaster at Baltimore, Md., in March, 1926. He served as assistant trainmaster at Baltimore, Md., Wilmington, Del., and Media, Pa., successively, until July, 1930, when he was assigned to the office of the general manager at New York. In May, 1932, Mr. Walter was transferred to the office of the chief engineer at Philadelphia, where he was assigned to duties for the chief engineer and the chief of freight transportation, continuing those duties after his appointment as trainmaster on June 16, 1934, until May 1, 1936, when he returned to New York as supervisor of freight service of the New York Zone.

H. H. Pevler, division engineer in the office of the chief engineer of the Pennsylvania at Philadelphia, Pa., has been promoted to superintendent of the Logansport division, with headquarters at

H. H. Pevler

Logansport, Ind. Mr. Pevler was born at Waynetown, Ind., on April 20, 1903, and graduated from Purdue University. He entered railway service with the Pennsylvania on May 4, 1927, as an assistant on the engineering corps of the Philadelphia Terminal division and four months later was promoted to assistant supervisor of track, with headquarters at Camden, N.J. The following year he was transferred to Altoona, Pa., and on April 8, 1929, he was advanced to supervisor of track, holding this position successively at York, Pa., Parkton, Md., Camden, Middletown, Pa., and Washington, D.C. On May 1, 1935, he was promoted to division engineer of the St. Louis division, with headquarters at Terre Haute, Ind. A short time later, he was transferred to the Ft. Wayne division and in May, 1936, to the Pittsburgh division. In August, 1937, he was transferred to the chief engineer's office at Philadelphia.

Engineering

P. W. Triplett, assistant division engineer of the New York division, with headquarters at Jersey City, N.J., has been promoted to division engineer of the Renovo division, with headquarters at Erie, Pa., succeeding Mr. Morris. **P. M. Roeper,** supervisor of track on the Middle division has been promoted to assistant division engineer of the New York division, with headquarters at Jersey City, succeeding Mr. Triplett.

C. F. Trowbridge, division engineer of the Philadelphia Terminal division of the Pennsylvania at Philadelphia, Pa., has been transferred to the Pittsburgh division, with headquarters at Pittsburgh, Pa. **J. D. Morris,** division engineer of the Renovo division at Erie, Pa., has been transferred to the Philadelphia Terminal division, with headquarters at Philadelphia. **E. L. Hoopes,** division engineer of the Philadelphia division at Harrisburg, Pa., has been appointed assistant to chief engineer maintenance of way, with headquarters at Pittsburgh. **P. X. Geary,** engineer, Washington Terminal Company, has been appointed division engineer, Philadelphia division, with headquarters at Harrisburg.

Wesley C. Brown, whose promotion to district engineer of the Northwestern and North Texas districts of the Missouri-Kansas-Texas, with headquarters at Denison, Tex., was announced in the April issue of *Railway Engineering and Maintenance,* was born at Denton, Tex., on December 16, 1889, and entered railway service in June, 1916, as a rodman in the engineering corps of the Katy, shortly thereafter becoming an instrumentman. In January, 1917, he was appointed assistant engineer, with headquarters at Dallas, and four years later he was appointed office engineer, with the same headquarters. Mr. Brown was appointed assistant engineer again in January, 1926, holding that position until his recent promotion.

Robert S. Gutelius, whose promotion to division engineer on the Delaware & Hudson, with headquarters at Oneonta, N.Y., was announced in the April issue, was born on September 17, 1896, at Anaconda, Mont., and received his higher education at Montana State college and Lafayette college. During the latter six months of 1918, Mr. Gutelius served with the field artillery of the United States Army. He entered the service of the Delaware & Hudson on June 15, 1920, as

Robert S. Gutelius

a transitman in the maintenance of way department at Carbondale, Pa., being appointed senior transitman at Oneonta, N.Y., on November 1, 1921. Two years later, Mr. Gutelius was advanced to track supervisor, with the same headquarters, remaining in this capacity until May 1, 1925. On that date, he was appointed roadmaster at Carbondale, in which capacity he remained for three years, then being promoted to general roadmaster with the same headquarters. On August 1, 1938, Mr. Gutelius was appointed acting division engineer at Oneonta, holding this position until his recent appointment as division engineer at the same point, which was effective on March 1.

Ritchie G. Kenly, whose retirement as chief engineer of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., was announced in the April issue, was born in Ritchie County, W. Va., on March 13, 1866, and attended Baltimore City College. He entered railway service in 1885 as a rodman and levelman on the Annapolis & Baltimore Shore Line (now the Washington, Baltimore & Annapolis

Ritchie G. Kenly

Electric) and in 1886 he went with the Baltimore & Eastern Shore (now part of the Pennsylvania) as a levelman. Later the same year he became a transitman

on a hydrographic survey of the Baltimore harbor but returned to railroad service the latter part of that year as an assistant supervisor on the Northern Central (now a part of the Pennsylvania). In 1891, he went with the Norfolk & Western as a supervisor and in 1893, he was promoted to assistant engineer. In 1897, he was advanced to assistant trainmaster. A year later Mr. Kenly went with the West Virginia Central & Pittsburgh (now the Western Maryland) as assistant to the chief engineer and in 1899, he went with the Philadelphia & Erie (now Pennsylvania) as a draftsman and construction engineer. The following year he became a supervisor on the Lehigh Valley and later that year was promoted to division engineer. In 1904, he was advanced to trainmaster, with headquarters at Easton, Pa., and in 1907, he was appointed a superintendent on the Lehigh & New England. Mr. Kenly returned to the Lehigh Valley in 1908 as engineer maintenance of way and the following year he went with the Minneapolis & St. Louis as chief engineer. In 1917, he was promoted to general manager and in 1918, he was appointed general superintendent. He was appointed assistant to the president and chief engineer in 1920 and in 1923, he resumed his former title of chief engineer, the position he held at the time of his retirement.

Track

E. A. Eastin, has been appointed supervisor of track on the Chesapeake & Ohio, with headquarters at Peru, Ind., succeeding **S. A. Ryan,** who has retired.

Alexander Watling, draftsman in the engineering corps of the Canadian National at Prince Albert, Sask., has been appointed acting roadmaster, with the same headquarters, succeeding **W. K. MacNaughton,** who died on February 21.

S. F. Knifong, roadmaster of the First district of the Washington division of the Union Pacific, with headquarters at Walla Walla, Wash., has retired. He was succeeded by **E. Redmond,** whose promotion was announced in the April issue.

John W. Fulk, section foreman on the Charlotte division of the Southern, with headquarters at Concord, N.C., has been promoted to track supervisor of the Columbia and Greenville line of the Columbia division, with headquarters at Greenwood, S.C.

Mathew H. Smith, whose retirement as roadmaster on the Gulf Coast Lines of the Missouri Pacific, with headquarters at Crystal City, Tex., was announced in the April issue, was born at Troup, Tex., on August 10, 1866, and entered railway service in June, 1887, as a section laborer on the International-Great Northern (now part of the Missouri Pacific Lines). In September, 1888, he was promoted to section foreman and in October, 1893, he resigned. He returned to the service of the I. G. N. as a section foreman two years later and in August, 1898, he went with the Southern Pacific, serving as a section foreman, extra gang foreman and yard foreman in and near San Antonio, Tex. He again returned to the I. G. N. in March, 1908, as a yard and extra gang foreman and on April 1, 1914, he was promoted to roadmaster, serving at San Antonio, and later on the Gulf Coast Lines at Crystal City until his retirement.

E. F. Boettcher, instrumentman on the engineering corps of the Chicago, Milwaukee, St. Paul & Pacific at Aberdeen, S.D., has been appointed acting roadmaster at that point, succeeding **A. J. Anderson,** whose death on April 10 is noted elsewhere in these columns.

A. E. Sharpe, roadmaster on the Canadian Pacific, with headquarters at North Battleford, Sask., has been transferred to Nipawin, Sask., replacing **A. Tronrud,** who has been transferred to Moose Jaw, Sask., relieving **B. O. Fryer,** whose promotion to assistant superintendent and roadmaster is announced elsewhere in these columns.

E. P. Adams, assistant supervisor of track on the Middle division of the Pennsylvania, has been promoted to supervisor of track on the Wilkes-Barre division, with headquarters at Reading, Pa., succeeding **W. C. Gretzinger** who has been transferred to the Middle division, with headquarters at Newport, Pa. Mr. Gretzinger succeeds **P. M. Roeper,** whose appointment as assistant division engineer is noted elsewhere in these columns. **G. W. Peoples,** has been appointed assistant supervisor of track on the Middle division, with headquarters at Altoona, Pa., succeeding Mr. Adams.

J. E. Daily, assistant roadmaster on the Scioto division of the Norfolk & Western, has been promoted to roadmaster on the Radford division, with headquarters at Roanoke, Va., succeeding **J. W. Neikirk,** whose promotion to assistant superintendent is noted elsewhere in these columns. **J. L. Ayers,** assistant roadmaster on the Pocahontas division has been transferred to the Scioto division with headquarters at Portsmouth, Ohio, to succeed Mr. Daily, and **R. F. Alley,** assistant roadmaster on the Radford division, has been transferred to the Pocahontas division, with headquarters at Grundy, Va., to replace Mr. Ayers.

Arthur M. Kennedy, Jr., whose appointment as supervisor of track on the Pennsylvania, with headquarters at Wheeling, W. Va., was announced in the April issue, was born on April 19, 1905, at Cranford, N.J., and received his higher education at Carnegie Institute of Technology, graduating in 1927. He entered railway service on January 21, 1929, as an assistant on the engineering corps of the Pennsylvania, serving in this capacity on various divisions until July 1, 1933, when he was promoted to assistant supervisor of track on the Buffalo division, with headquarters at Buffalo, N.Y., later serving in the same capacity on the Eastern, Middle and Maryland divisions. On May 1, 1936, Mr. Kennedy was further promoted to supervisor of track on the latter division, with headquarters at Perryville, Md. After two years in this capacity he was appointed assistant supervisor of track on the same division, with headquarters at Washington, D.C., remaining in this position until his recent appointment as supervisor of track on the Panhandle division at Wheeling.

George C. Vaughan, whose promotion to supervisor of track on the Pennsylvania, with headquarters at Homestead, Pa., was announced in the April issue, was born on May 3, 1909, at Washington, D.C., and received his higher education at Lehigh University. He entered railway service with the Pennsylvania on June 23, 1930, as an assistant on the engineering corps and served alternately in this capacity and as assistant supervisor of track until November 16, 1936, when he was appointed acting supervisor of track in the office of the engineer maintenance of way at Harrisburg, Pa. On April 14, 1938, he was appointed assistant supervisor of track with headquarters at Philadelphia, Pa., where Mr. Vaughan remained until his recent promotion to supervisor of track at Homestead.

Bridge and Building

M. P. Blake has been appointed bridge and building master, Montreal terminals, Canadian National, with headquarters at Montreal, Que., succeeding **A. C. Oxley,** who has been transferred.

Obituary

W. K. MacNaughton, roadmaster on the Canadian National, with headquarters at Prince Albert, Sask., died at that point on February 21.

Malcolm K. McQuarrie, engineer of the Dominion Atlantic railway, with headquarters at Kentville, N.S., died in Montreal, Que., on March 15 at the age of 54.

Homer L. Hunter, office engineer on the Atchison, Topeka & Santa Fe, Eastern Lines, with headquarters at Topeka, Kan., died suddenly at that point on March 24.

Arthur P. Wells, engineer of tests of the Central of Georgia, with headquarters at Savannah, Ga., died in the company hospital in that city on March 27, after a long illness. He was 66 years old.

Wallace S. King, general tie and timber agent, Chesapeake & Ohio, Nickel Plate and Pere Marquette, with headquarters at Cleveland, Ohio, died at his home in Richmond, Va., on April 14, as the result of a heart attack.

A. J. Anderson, roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Aberdeen, S.D., died suddenly on April 10. Mr. Anderson was promoted to roadmaster at Aberdeen, S.D., in March, 1917, and held that position until his death.

James A. Spurlock, roadmaster on the Missouri-Kansas-Texas, with headquarters at Muskogee, Okla., died of pneumonia in that city on March 20, 1939. Mr. Spurlock entered the service of the Katy on March 20, 1919, as a section foreman. Three years later he was promoted to roadmaster, with headquarters at Wichita

Falls, Tex., and he was later transferred to Smithville, Tex., and Muskogee.

Erskine Duncan, assistant chief engineer of the Toronto Terminals, with headquarters at Toronto, Ont., died at that point on April 10. Mr. Duncan was born in Scotland and came to Canada in 1904. He was with the Canadian Pacific until the World War and after returning from overseas he served with the Ontario Hydro-electric Power Commission and the Toronto Transportation Commission.

Thomas Benton Robson, who retired on June 1, 1925, as roadmaster on the Louisville & Nashville, with headquarters at Evansville, Ind., died at that point on March 18. Mr. Robson was born in Dover Plains, N.Y., on June 12, 1851, and entered railway service on July 1, 1877, at Guthrie, Ky., as an assistant engineer on the L. & N. On June 1, 1883, he was promoted to roadmaster of the St. Louis division and on June 1, 1904, he went with the Chesapeake & Nashville (now part of the L. & N.), as superintendent, with headquarters at Gallatin, Tenn. Two years later he returned to the L. & N. as roadmaster on the St. Louis division, with headquarters at Evansville, Ind., and remained in that position until his retirement in 1925.

Supply Trade News

General

The Allen Equipment & Supply Co., Inc., 30 Church street, New York, representing manufacturers of railroad, contractors and shipyard supplies, has been appointed New York sales agent for the **Northwestern Motor Company,** Eau Claire, Wis. The Northwestern Motor Company was formerly represented in New York by Walter H. Allen. The Allen Equipment & Supply Co., Inc., was formed in January, 1937, with **D. W. Dinan,** formerly vice-president and general manager of the New York Central, Eastern lines, as president and **Walter H. Allen,** a railway supply man in New York, as vice-president.

Personal

C. R. MacBride has been appointed manager of the engineering service department of the **A. M. Byers Company,** Pittsburgh, Pa.

Walter F. Munford, superintendent of the **American Steel & Wire Co.'s** Cuyahoga works, Cleveland, Ohio, has been appointed assistant to vice-president (operations) at the main office.

Robert C. Stanley has been elected a director of the **United States Steel Corporation** and a member of the finance committee succeeding **Walter S. Gifford. W. A. Irvin,** in accord with his expressed intention of last year, and after 44 years of service with the corporation, has retired from the office of vice-chairman of the board, which has been abolished. Mr. Irvin will continue as a member of the board of directors and finance committee.

Ervin J. Sanne, district sales manager of the **Inland Steel Company,** with headquarters at St. Paul, Minn., has been promoted to assistant manager of sales of the **Sheet and Strip Steel division,** with headquarters at Chicago, and has been succeeded by **Frederick A. Ernst,** assistant district sales manager at St. Louis, Mo. **Harry A. Johnson** of the St. Paul office has been promoted to assistant district sales manager at St. Paul.

Ervin J. Sanne

Mr. Sanne has been district sales manager of the Inland Steel Company at St. Paul since 1936. Prior to that time he was associated with Joseph T. Ryerson & Son, Inc., now a subsidiary of the Inland Steel Company, having entered the employ of that company in 1917. He was active in the sales department at Chicago from 1921 to 1936.

Mr. Ernst has been assistant district sales manager of the Inland Steel Company at St. Louis since 1936. He entered the steel industry in 1914 with the Trumbull Steel Company and was successively affiliated with the Falcon Steel Company, the Granite City Steel Company and the Columbia Steel Company, prior to his association with the Inland Steel Company at St. Louis in 1928.

Frederick A. Ernst

L. H. Chamberlain, district manager of the Water Works Supply Company and the U. S. Pipe & Foundry Co., Los Angeles, Cal., has been appointed manager of the water works sales section of the **Crane Company,** Chicago. **W. A. Dallach** will be Mr. Chamberlain's assistant.

Thomas O'Leary, Jr., sales manager of the Western division of the Transportation department of the **Johns-Manville Sales Corporation,** has been advanced to sales manager of the Western region of the same department with jurisdiction over the Western, Southwestern and Pacific divisions of that department. As heretofore, he will have his headquarters at Chicago. **C. M. Patten,** assistant sales manager of the Southwestern division of the Transportation department, has been appointed sales manager of that division, with headquarters as before at St. Louis, Mo., succeeding **A. C. Pickett,** who has resigned to accept another position.

Mr. O'Leary was born at San Francisco, Cal. He received his early training on the Southern Pacific and in 1911, became associated with the New York Air Brake Company as mechanical representative in San Francisco, and later as sales representative with headquarters at Denver, Colo. He entered the army as a second lieutenant, later becoming a captain. On his return after 15 months' service overseas, he again became associated with the New York Air Brake Company. In 1925 he joined the sales force of Johns-Manville as special representative, with headquarters at Salt Lake City, Utah. He was promoted to assistant manager of the Western division of the Transportation department in December, 1927, and to sales manager of the Western division in February, 1935.

Mr. Patten was born at Delavan, Ill., and was connected with the Missouri Pacific from 1909 until 1917, when he entered the service of Johns-Manville as a sales representative with headquarters at St. Louis and later at Omaha, Neb. He returned to St. Louis in October, 1936, as assistant sales manager of the Southwestern division.

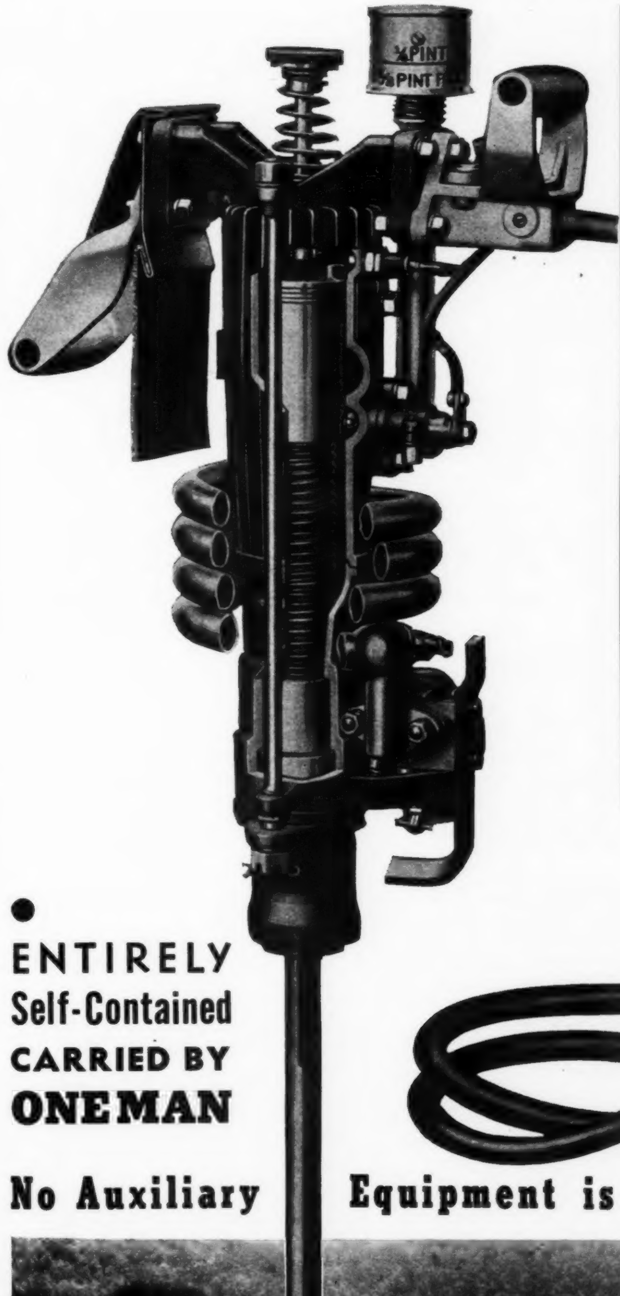
Obituary

Edward A. Nixon, retired president of the **Western Tie & Timber Company,** St. Louis, Mo., died in Chicago on March 26. He was born in Lafayette, Ind., in 1859.

William H. Fogarty, Sr., assistant vice-president of the **Johns-Manville Corporation,** with headquarters at Chicago, died of a heart ailment on April 9, in Evanston, Ill.

E. L. Langworthy, who was associated with the **Adams & Westlake Company** for over 50 years, during 30 of which he was eastern manager, died at his home in Philadelphia, Pa., on April 11, at the age of 84 years.

Charles B. Coates, electrical engineer for the Chicago Pneumatic Tool Company, with headquarters at Cleveland, Ohio, died on March 17, at the age of 69 years. Mr. Coates was a native of Erie, Pa., and a graduate of Cornell university. He had been with the Chicago Pneumatic Tool Company since 1908, first in the capacity of manager of electric tool sales and later serving in the engineering department.



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"Bill, how do you account for the fact that the ..... Company is making greater progress in getting its device in on the railroads than we are? We brought our devices out about the same time."

"That's true, Boss. In fact, we had a couple months' start on them."

"What's the trouble, then? Isn't our device as good as theirs?"

"It's better, Boss. A lot of railway men say so, after they've seen it."

"Why are they beating us, then? Aren't you as good a salesman as their man?"

"That's what has had me worried. And it was only last week that I discovered the answer."

"Let's have it."

"All right, Boss. It's just this: You remember that when we brought out our device you gave me samples and turned me loose to call on these railway men, one at a time."

"That's right. And the ..... Company did the same thing, didn't it?"

"That's right, except that they also announced their device to the field through an advertisement in Railway Engineering and Maintenance, and they've been talking about it in every issue since."

"How did that help?"

"It helped a lot, Boss. Whenever I go into a railway man's office to show our device, it's a new idea to him and he wants to think it over and talk with his associates about it. You know railway men seldom buy anything on the first call."

"That's true. But the ..... Company faced the same problem, didn't it?"

"Yes, with this exception—when their man called on these railway officers, they were familiar with his device from the advertising and in many instances were already interested in it so he could get right down to business."

"You mean that this advertising served as an introductory call?"

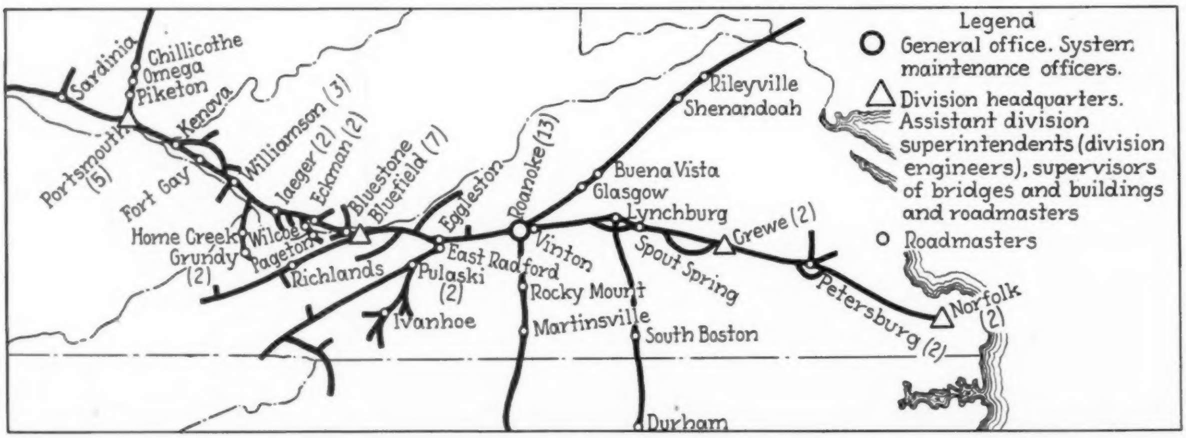
"That's it, Boss. It gave them a big lead over us."

"If I get your point, this advertising saved a lot of their salesmen's time."

"It always does, Boss. It would help us keep *our* railway customers informed regarding our products. And it would keep our name before them so they would come to regard us as old friends, even though we can't call on them personally very often."

"I believe you're right, Bill. We'll tell our story too—in the magazine these men read. It'll save a lot of your time."

"That's great, Boss. And don't forget that this magazine goes to a lot of men whom we never see but who have a lot of influence with the men we do have to sell."



Railway Engineering and Maintenance Goes Every Month to 70 Supervisory Maintenance Officers on the Norfolk & Western at **1 General Office, 5 Division Offices and 33 Other Supervisory Headquarters,** Scattered All the Way from Norfolk, Va., to Sardinia, Ohio. This Magazine Also Goes to 7 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on These Lines.

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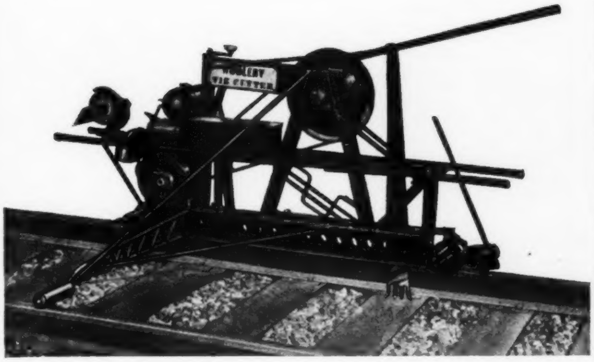

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★ BOUGHT 24 IN '39!!

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DO A QUICKER JOB . . .

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DO IT CHEAPER . . .

Savings of 30% or more are ordinary when Woolery Tie Cutters are used. Woolery Tie Cutters pay for themselves in 60 days.

Arrange for a demonstration on your track NOW or send for our new 12 page descriptive booklet.

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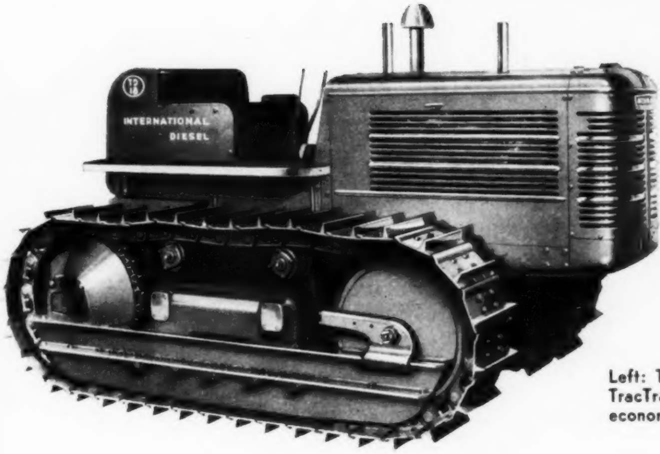

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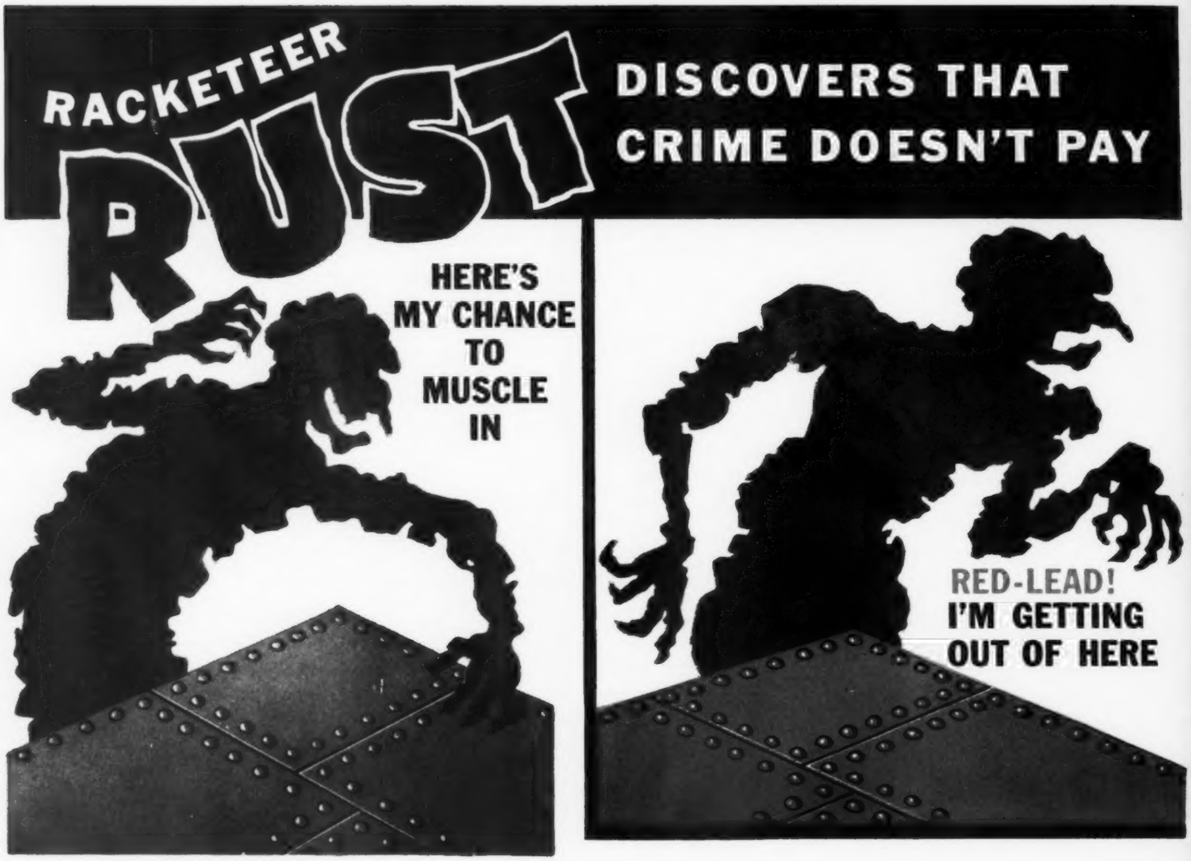
(Incorporated)
180 North Michigan Avenue **Chicago, Illinois**

An International T-40 TracTracTor working with a bulldozer on a typical "off-track" job. TracTracTors do more work at less cost on a great variety of work like this.

INTERNATIONAL Industrial Power



DUTCH BOY RED-LEAD

In the fight against Rust, Dutch Boy Red-Lead has a record to be proud of. On millions of square feet of metal surfaces—in every major American industry—this paint is on guard to prevent Rust from levying tribute. So no one can be called an experimenter—or a chance taker—when he specifies Dutch Boy Red-Lead.

First and foremost, this paint has "stick-to-itiveness." It takes hold and holds fast. At the same time, it is highly elastic—expansion or contraction of the metal surface does not loosen its grip. It not only keeps out moisture but also resists the destructive action of other common causes of corrosion—such as gases, smoke and salt water.

Dutch Boy Red-Lead comes in both paste and liquid form, the latter including a quick-drying type for use when allowable drying time is short. The pigment in every case is pure red-lead that contains more than 97% Pb_3O_4, thus assuring easier application, higher spreading rate and a uniform film of greater density.

For long service, and complete dependability, specify Dutch Boy Red-Lead.

NATIONAL LEAD COMPANY

111 Broadway, New York; 116 Oak St., Buffalo; 900 West 18th St., Chicago; 659 Freeman Ave., Cincinnati; 1213 West Third St., Cleveland; 722 Chestnut St., St. Louis; 2240 24th St., San Francisco; National-Boston Lead Co., 800 Albany St., Boston; National Lead & Oil Co. of Penna., 316 Fourth Ave., Pittsburgh; John T. Lewis & Bros. Co., Widener Building, Philadelphia.